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UNITED STATES NAVAL INSTITUTE PROCEEDINGS

Vol. 53 OCTOBER, 1927 No. 296

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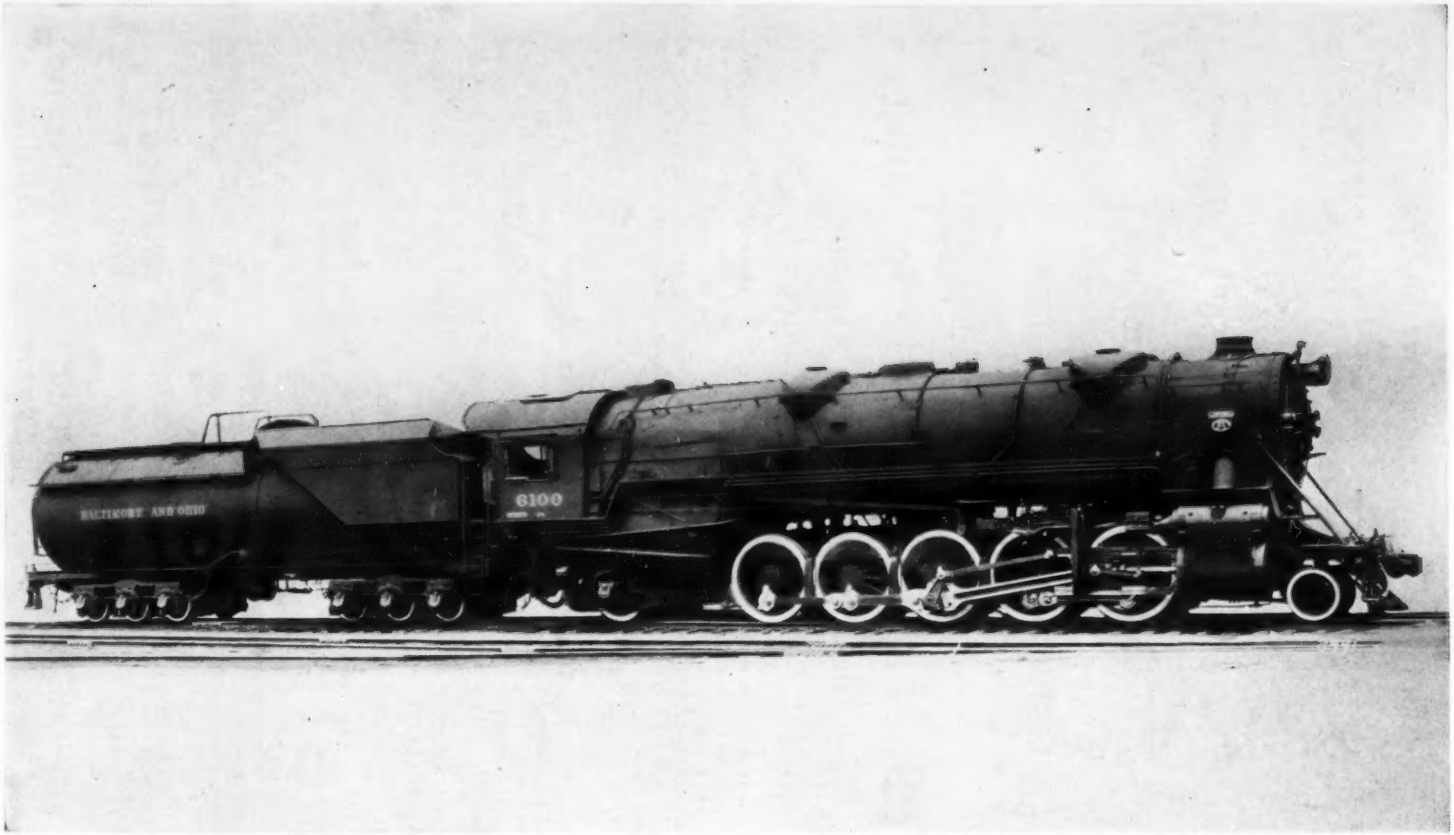

Courtesy of the Baltimore and Ohio Railroad Company

No. 6100, Santa Fe Type, Class S-1. Built by the Baldwin Locomotive Works, 1923

Cylinders, 30 x 32 inches; boiler pressure, 220 pounds; drivers, 64 inches; tractive power, 84,300 pounds; weight on drivers, 347,230 pounds; weight on front truck, 31,570 pounds; weight on back truck, 57,710 pounds; total weight engine, 436,510 pounds; weight engine and tender 734,910 pounds.

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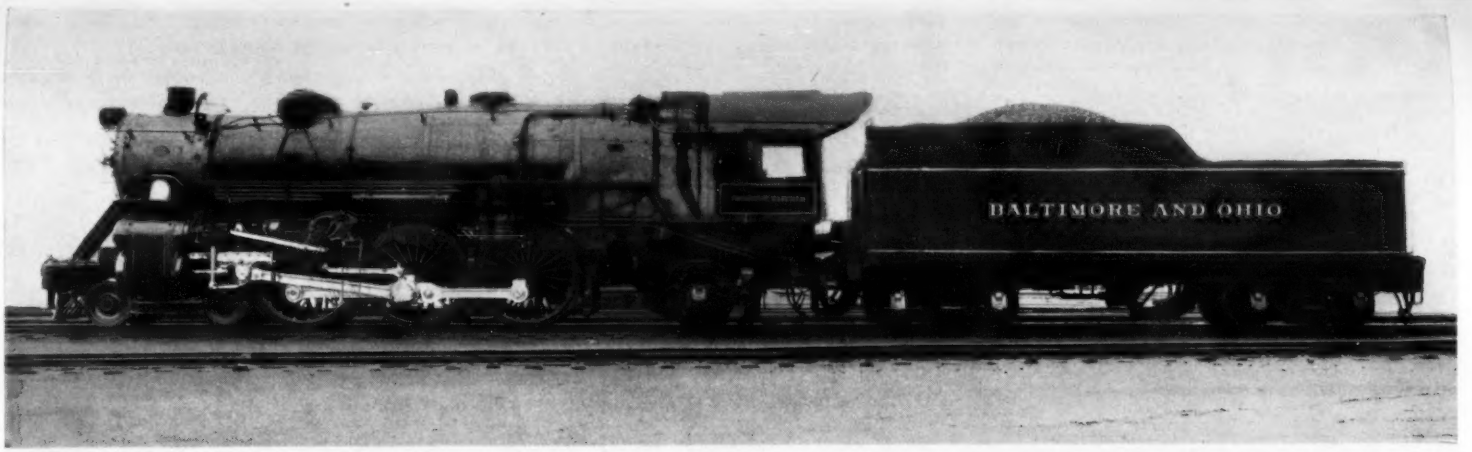
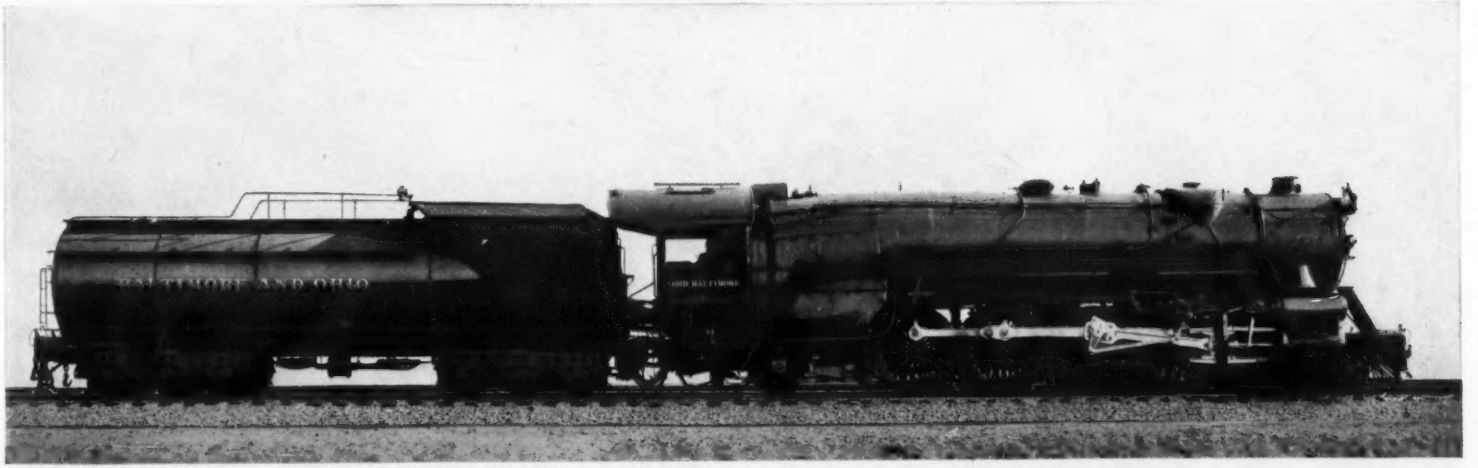


Baldwin Pacific Type for Heavy Passenger Washington-New York Service



Courtesy of the Baltimore and Ohio Railroad Company

Mountain Type Built by the Company in Baltimore for Heavy Mountain Passenger Service

Courtesy of the Baltimore and Ohio Railroad Company

NO. 6000, SANTA FE TYPE, CLASS S, HAULING HEAVY COAL TRAIN WITH HELPER UP TERRA ALTA, 2.2 PER CENT GRADE

Cylinders, 30 x 32 inches; boiler pressure, 190 pounds; total weight engine, 407,000 pounds.

Courtesy of the Baltimore and Ohio Railroad Company

No. 6000, Santa Fe Type, Class S, Hauling Heavy Coal Train with Helper up Terra Alta, 2.2 Per Cent Grade
Cylinders, 30 x 32 inches; boiler pressure, 190 pounds; total weight engine, 407,000 pounds.

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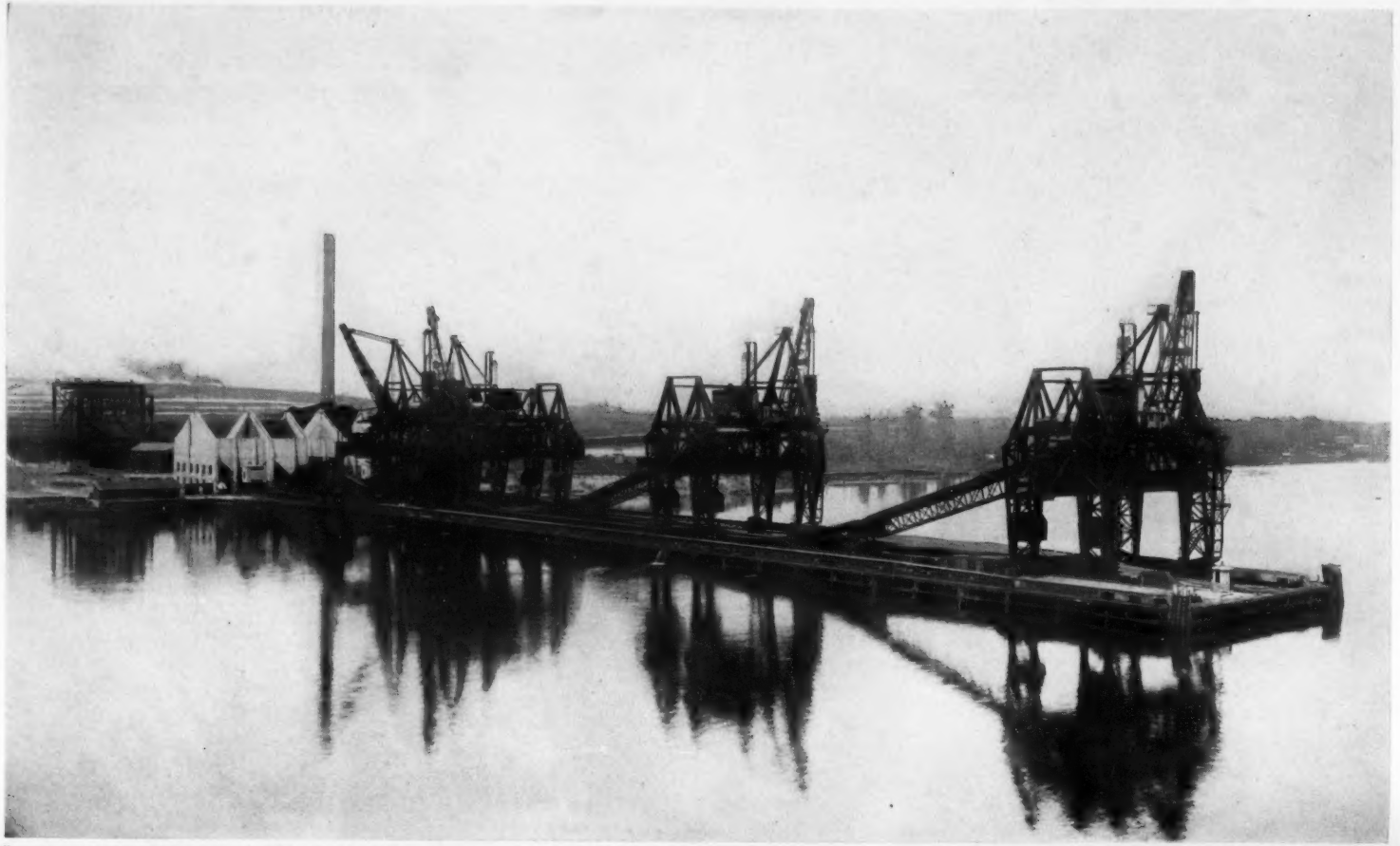

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THE CURTIS BAY COAL PIER FOR THE RAPID HANDLING OF COAL

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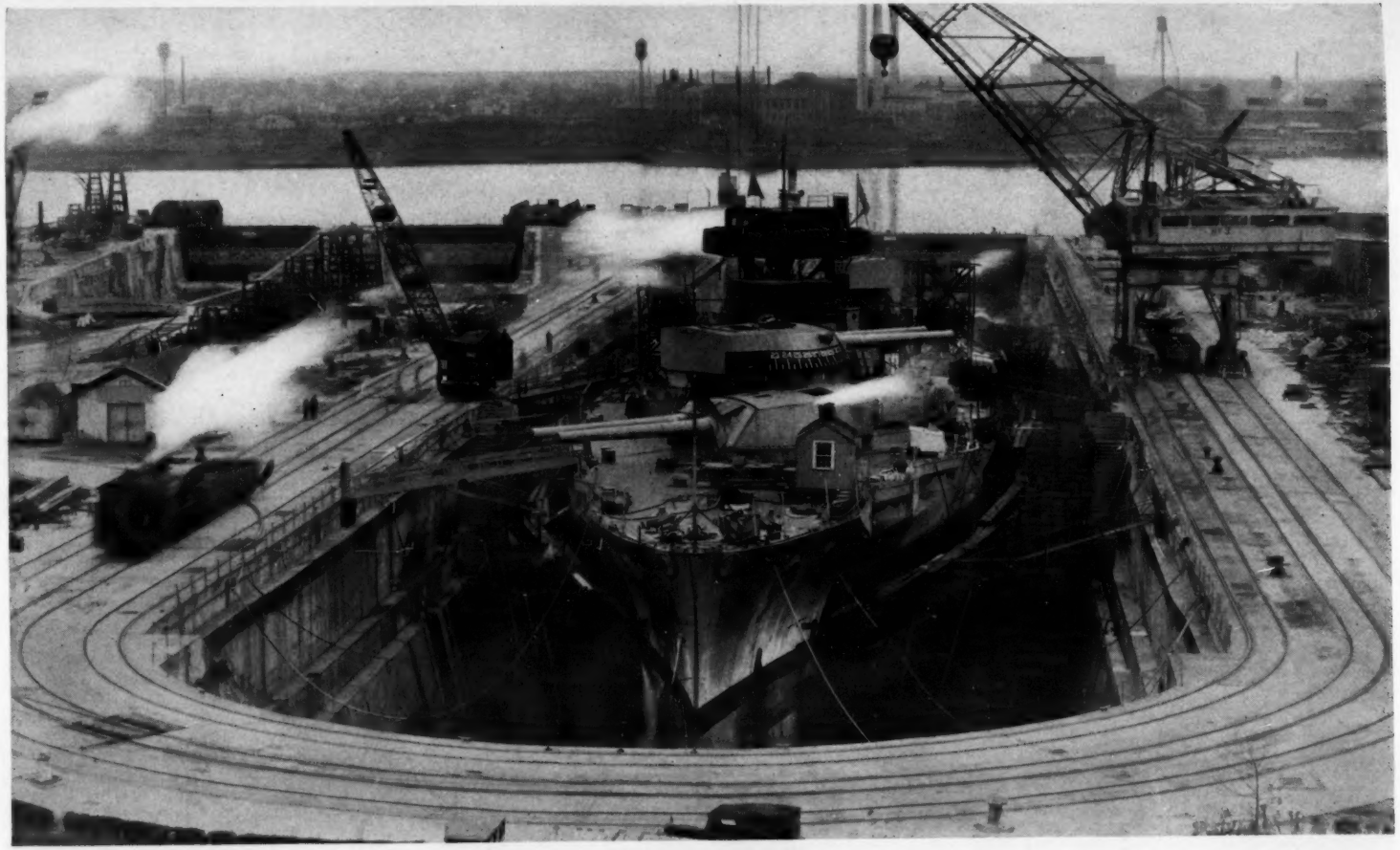
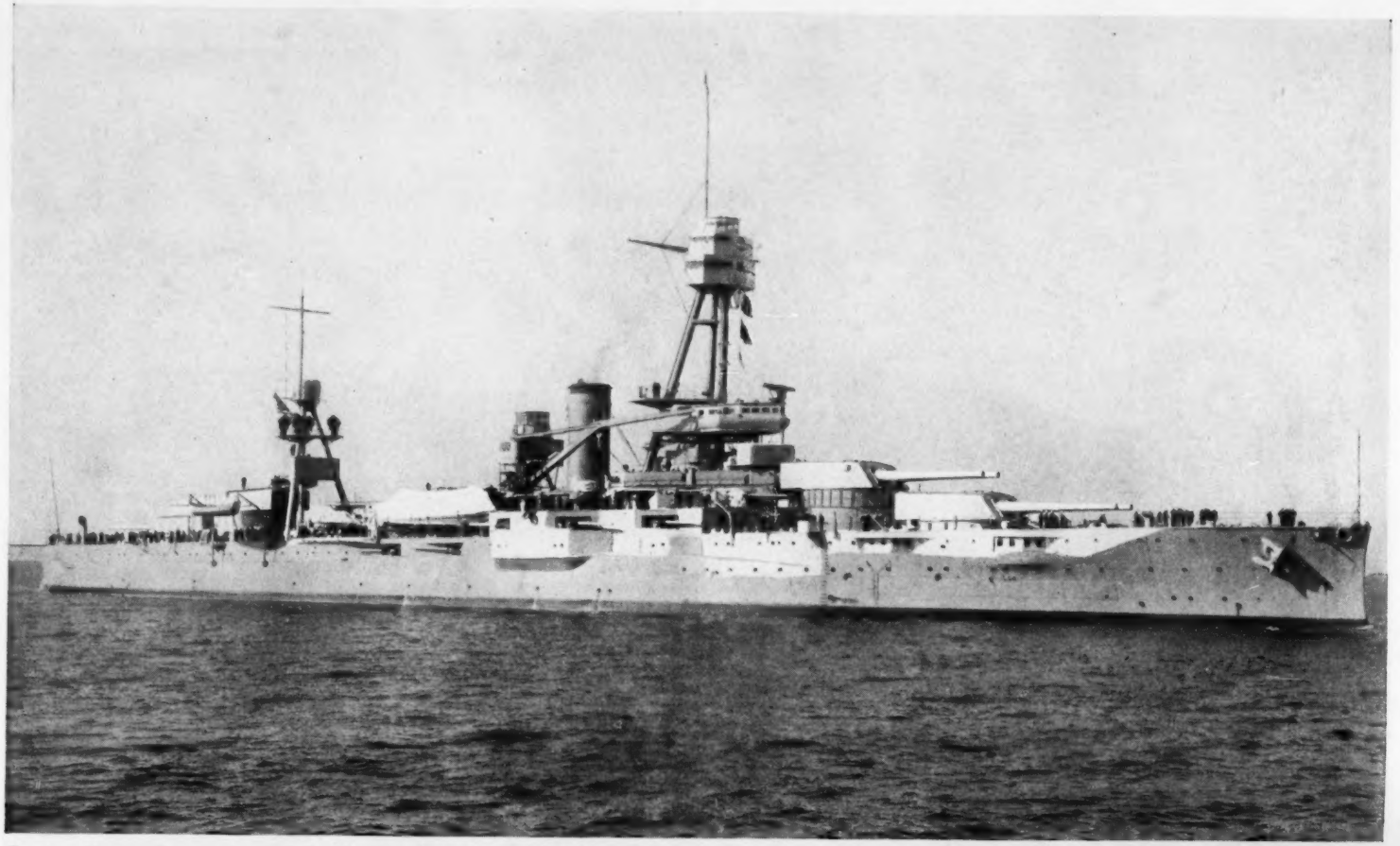


Courtesy of Navy Yard, Norfolk, Virginia

BATTLESHIP "NEW YORK" AT NORFOLK NAVY YARD UNDERGOING MODERNIZATION

The vessel is in dry dock for purpose of fitting blister. Cage masts have been removed and tripod masts are to be fitted. Photograph taken April 10, 1927



Courtesy Bureau Construction and Repair, Navy Department, Washington, D. C.

U.S.S. "TEXAS" AFTER MODERNIZATION

The *Texas* is soon to be the flagship of Admiral Henry A. Wiley, the new Commander-in-Chief of the United States Fleet.

Courtesy Bureau Construction and Repair, Navy Department, Washington, D. C.

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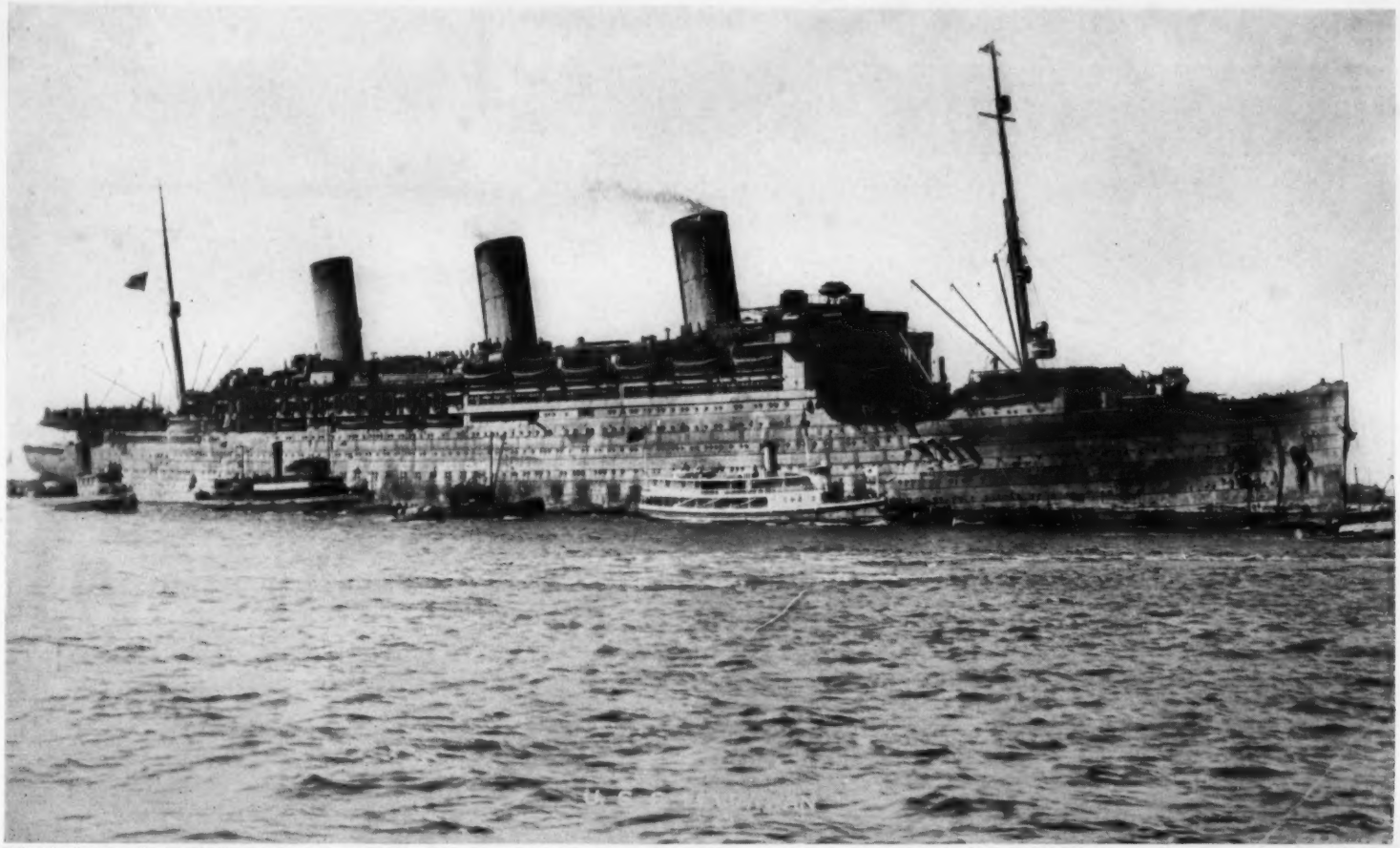
Courtesy of the Navy Department, Washington, D. C.

THE U.S.S. "TEXAS" FROM THE AIR, PASSING THE "MAYFLOWER"

Note the small figures outlining the upper decks—these are members of the crew "manning the rail" in honor of President Coolidge whose flag is flying on the *Mayflower* at the Presidential Review of the fleet at Hampton Roads.

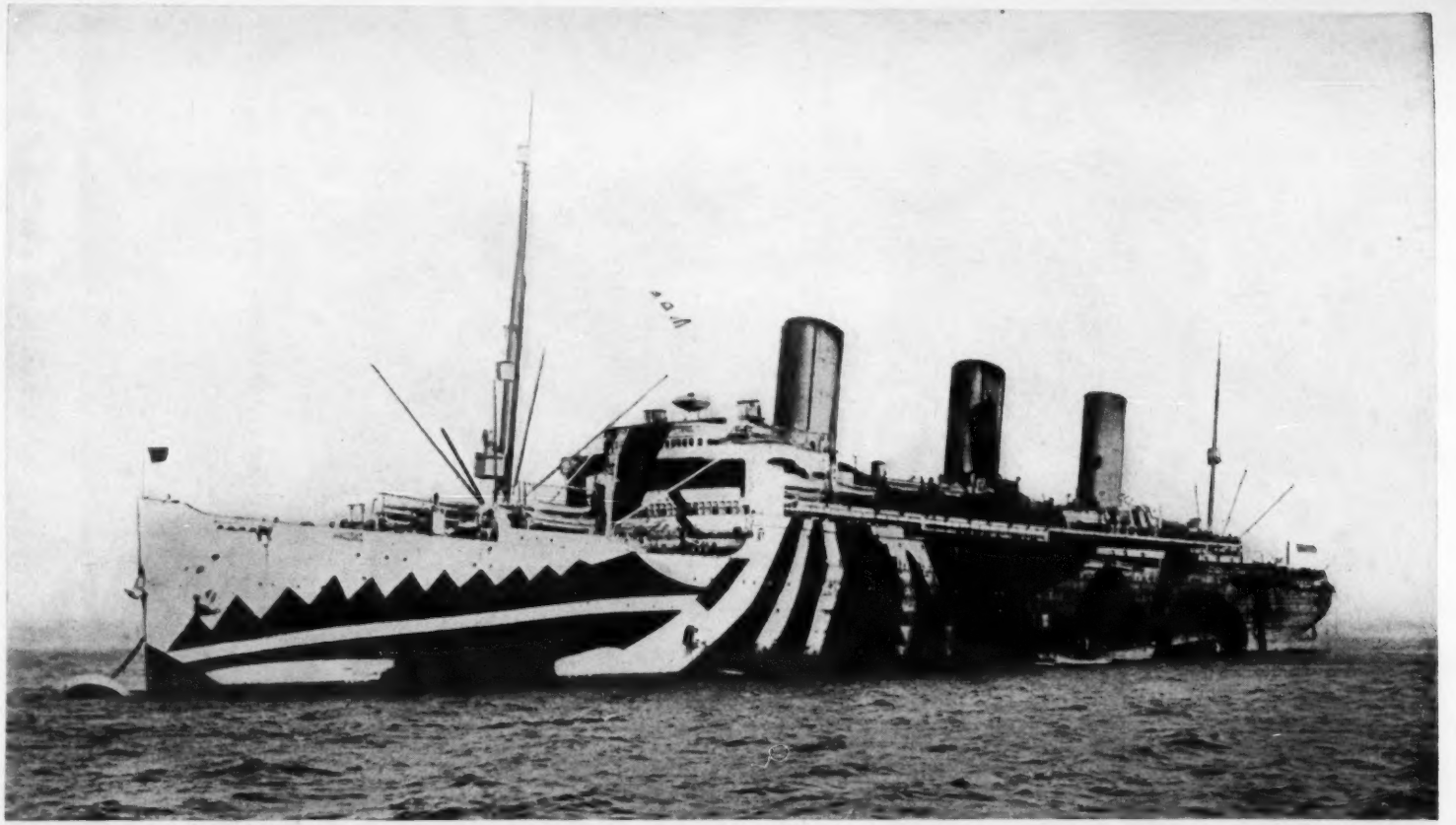


Official photograph, U. S. Navy

U.S.S. "Leviathan" in War Service Ready to Carry Our Troops to Europe. Before Being "Camouflaged"

Official photograph, U. S. Navy

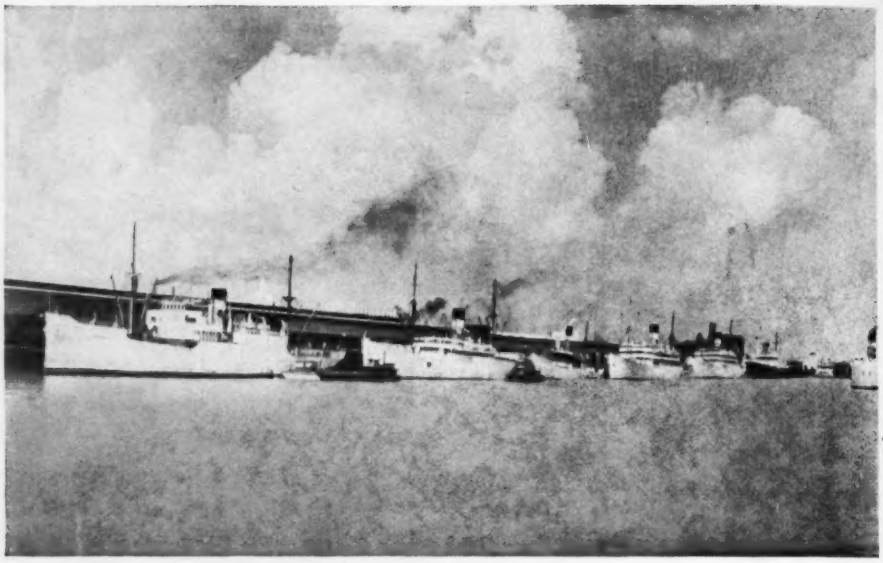
U.S.S. "LEVIATHAN" IN WAR SERVICE READY TO CARRY OUR TROOPS TO EUROPE. BEFORE BEING "CAMOUFLAGED"



Official photograph, U. S. Navy

U.S.S. "LEVIATHAN" IN CAMOUFLAGE

Camouflage strictly speaking is for the purpose of making the object camouflaged hidden from view. The British used the expression "dazzle-paint," the British plan being to dazzle the submarine commander so he would have great difficulty in estimating his target's course, and not painted to *hide* the ship or have it blend in with the sea and horizon.

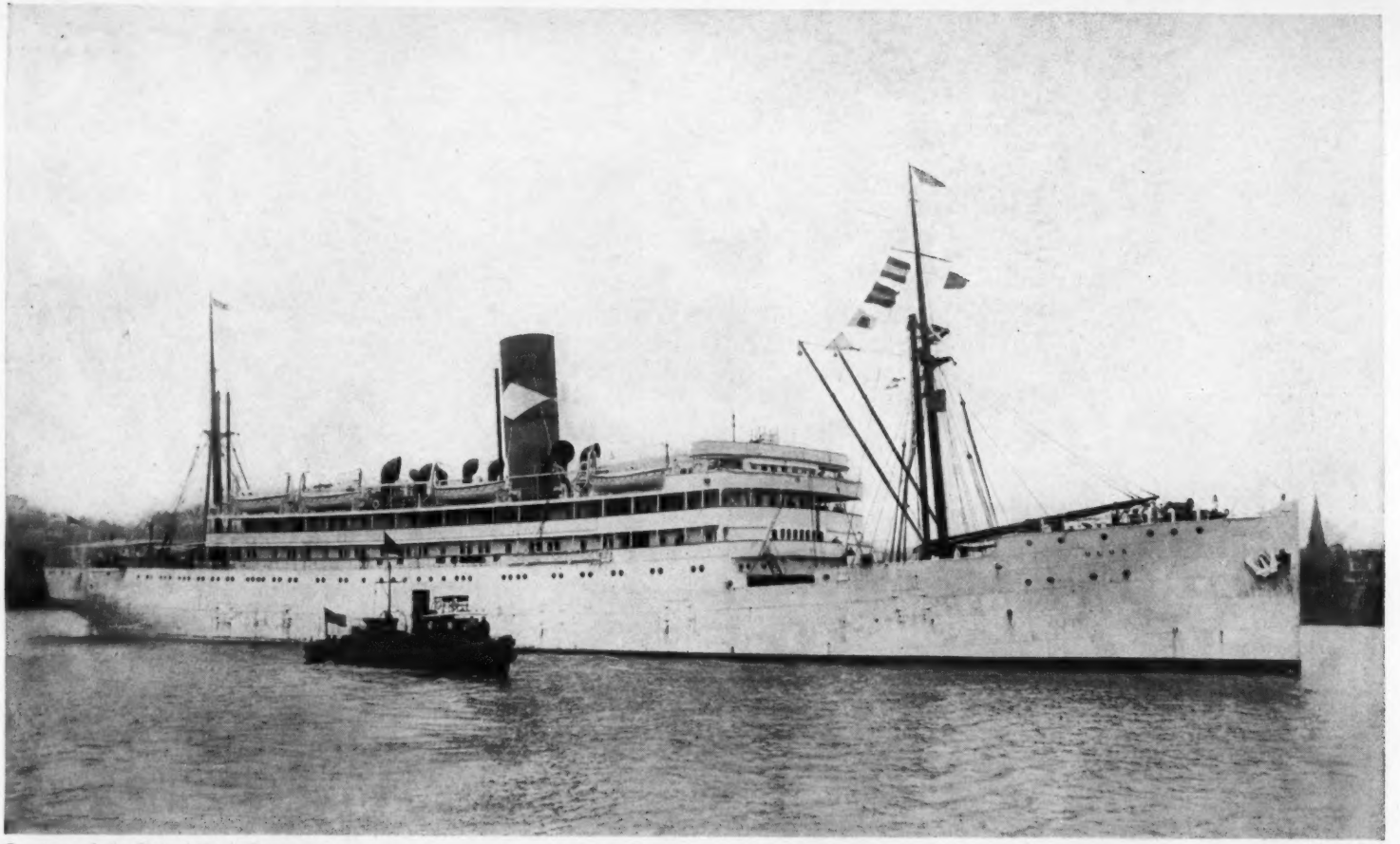


PORT OF NEW ORLEANS

The public wharves of the port extend over seven miles in length and are covered by modern transit sheds. Vessels maintain regular service from New Orleans to the principal ports of the world.

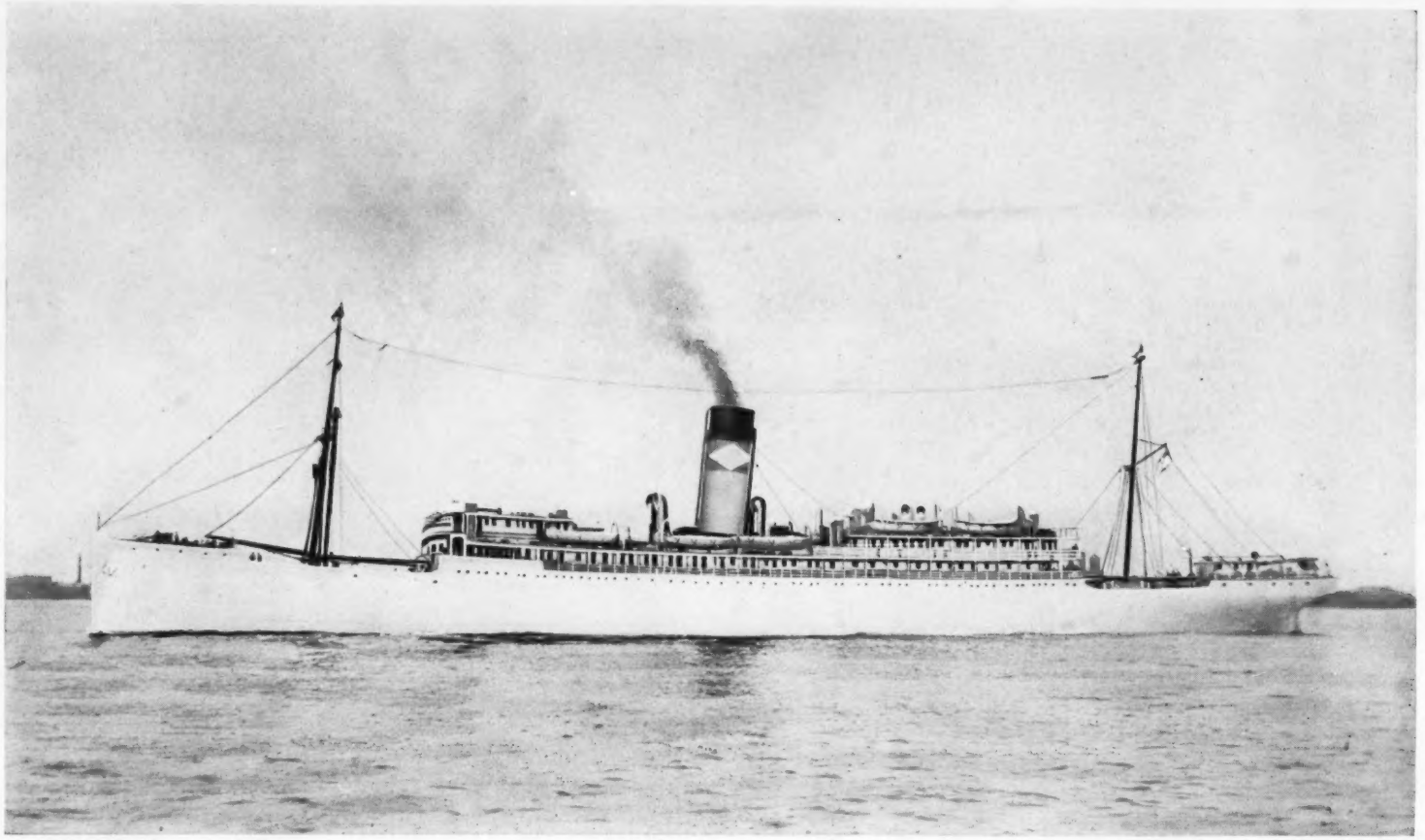
Courtesy of the United Fruit Company

PRESENT TYPE VESSEL—S.S. "SAN BLAS." SMALLER THAN THE S.S. "ULUA"



Courtesy of the United Fruit Company

PRESENT TYPE VESSEL—S.S. "ULUA." LARGER THAN THE "SAN BLAS" TYPE



Courtesy of the United Fruit Company

PRESENT TYPE—S.S. "CALAMARES"—SISTER SHIP OF S.S. "ULUA"

One of the seventy-nine ships maintaining a regular service between Atlantic ports of the United States, Central and South America, Cuba, Jamaica, England and Europe.

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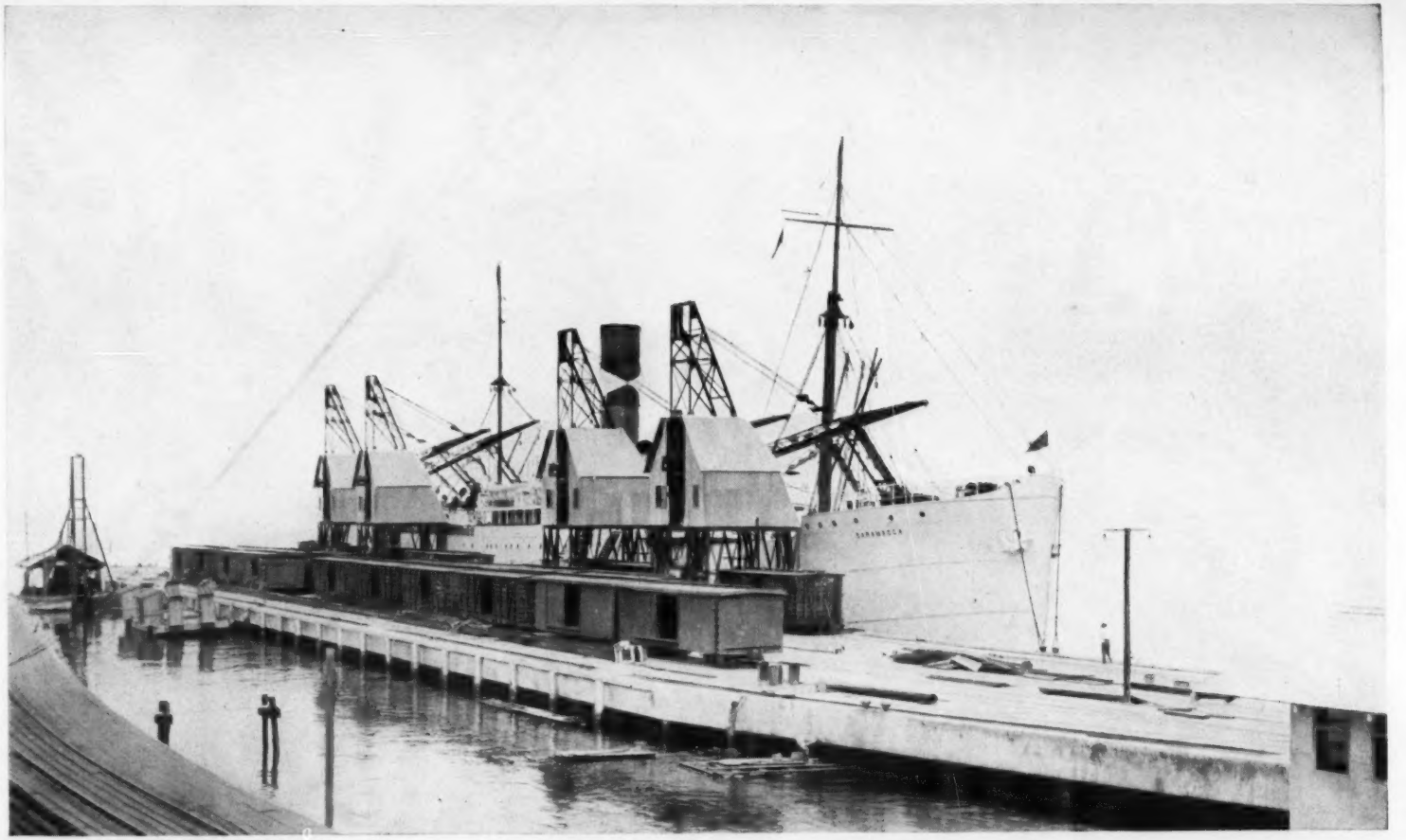
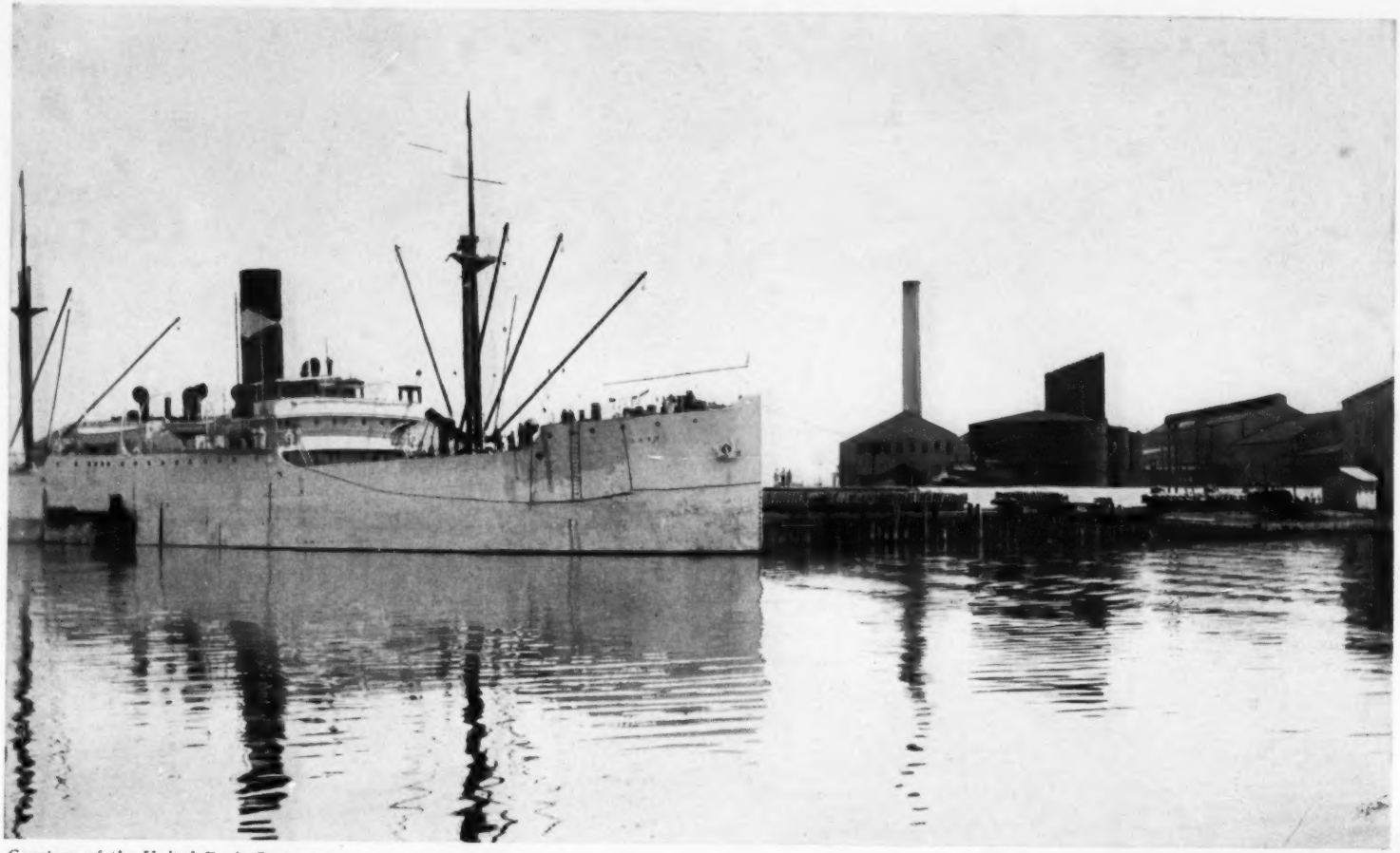


Courtesy of the United Fruit Company

LOADING BANANAS WITH CONVEYOR, PUERTO CASTILLA, HONDURAS



Courtesy of the United Fruit Company

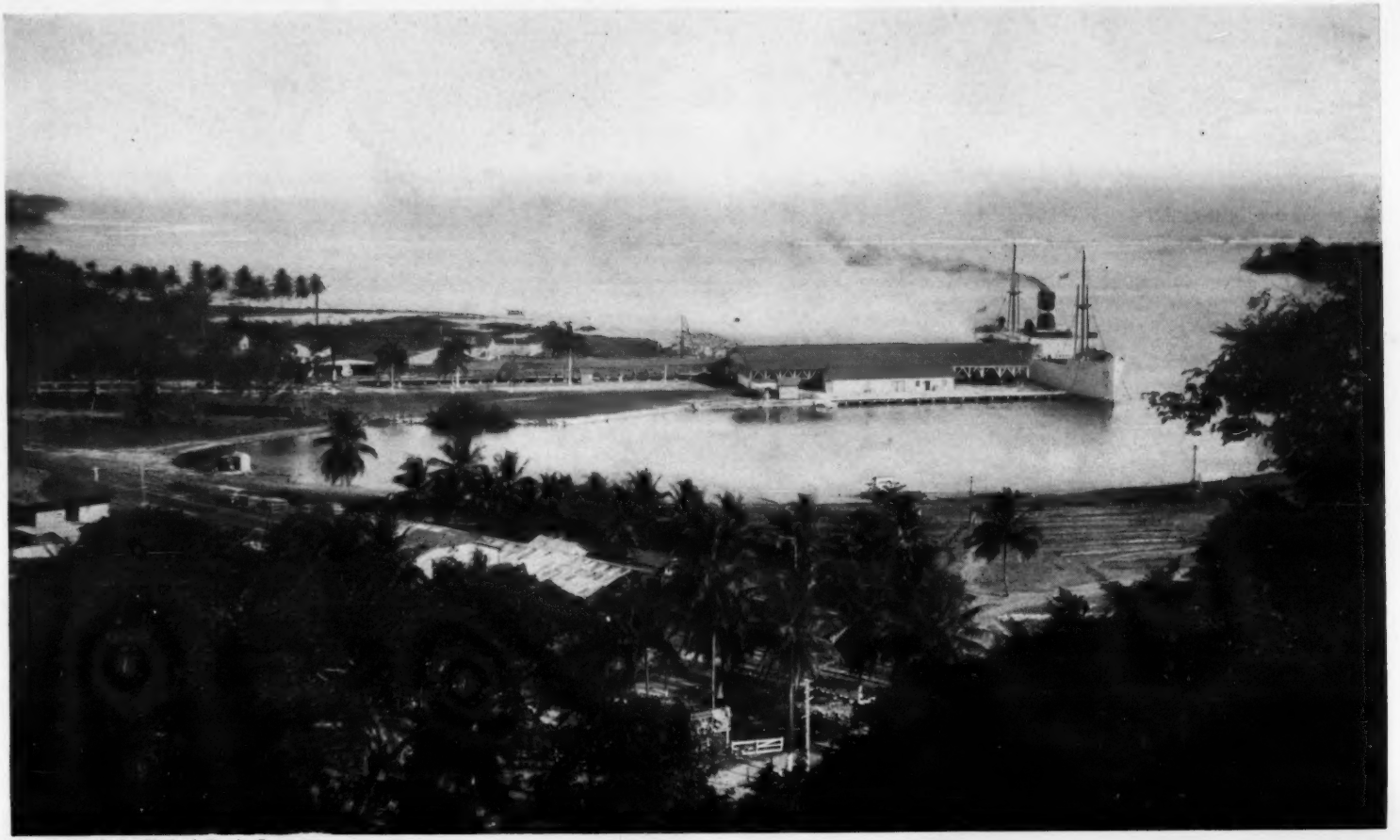
VIEW SHOWING MACABI WHARF WITH S.S. "MARAVI" LOADING SUGAR. MOLASSES TANK AND MILL AT BACK. CUBA.

Courtesy of the United Fruit Company

VIEW SHOWING MACABI WHARF WITH S.S. "MARAVI" LOADING SUGAR. MOLASSES TANK AND MILL AT BACK. CUBA.

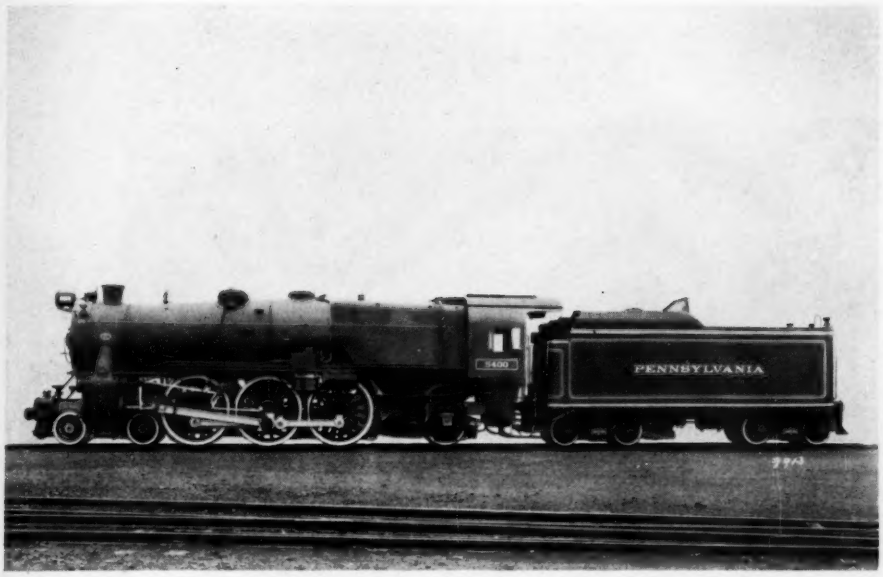
Courtesy of the United Fruit Company

BIRDSEYE VIEW OF RAILWAY SHOPS, SANTA MARTA, COLOMBIA



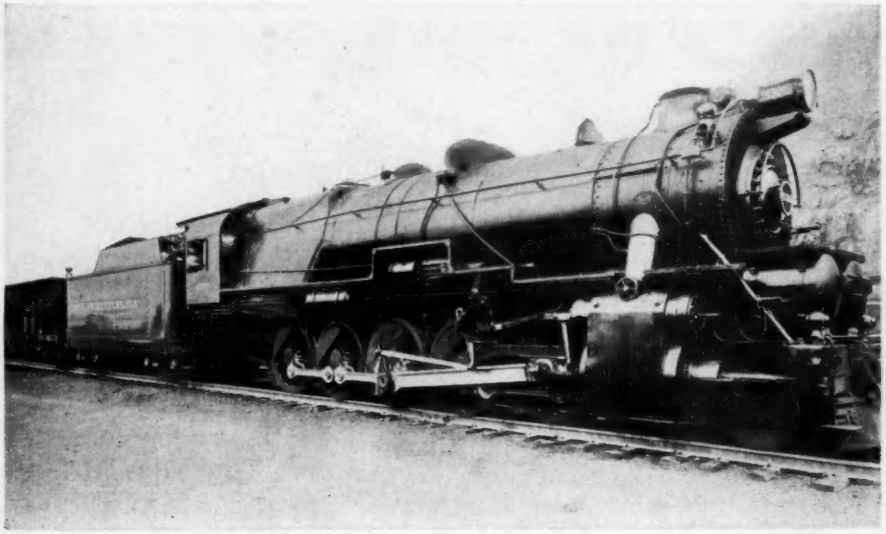
Courtesy of the United Fruit Company

PANORAMA OF BOUNDBROOK WHARF, PORT ANTONIO, JAMAICA



Steam Locomotive Type "K-4s" (Passenger)

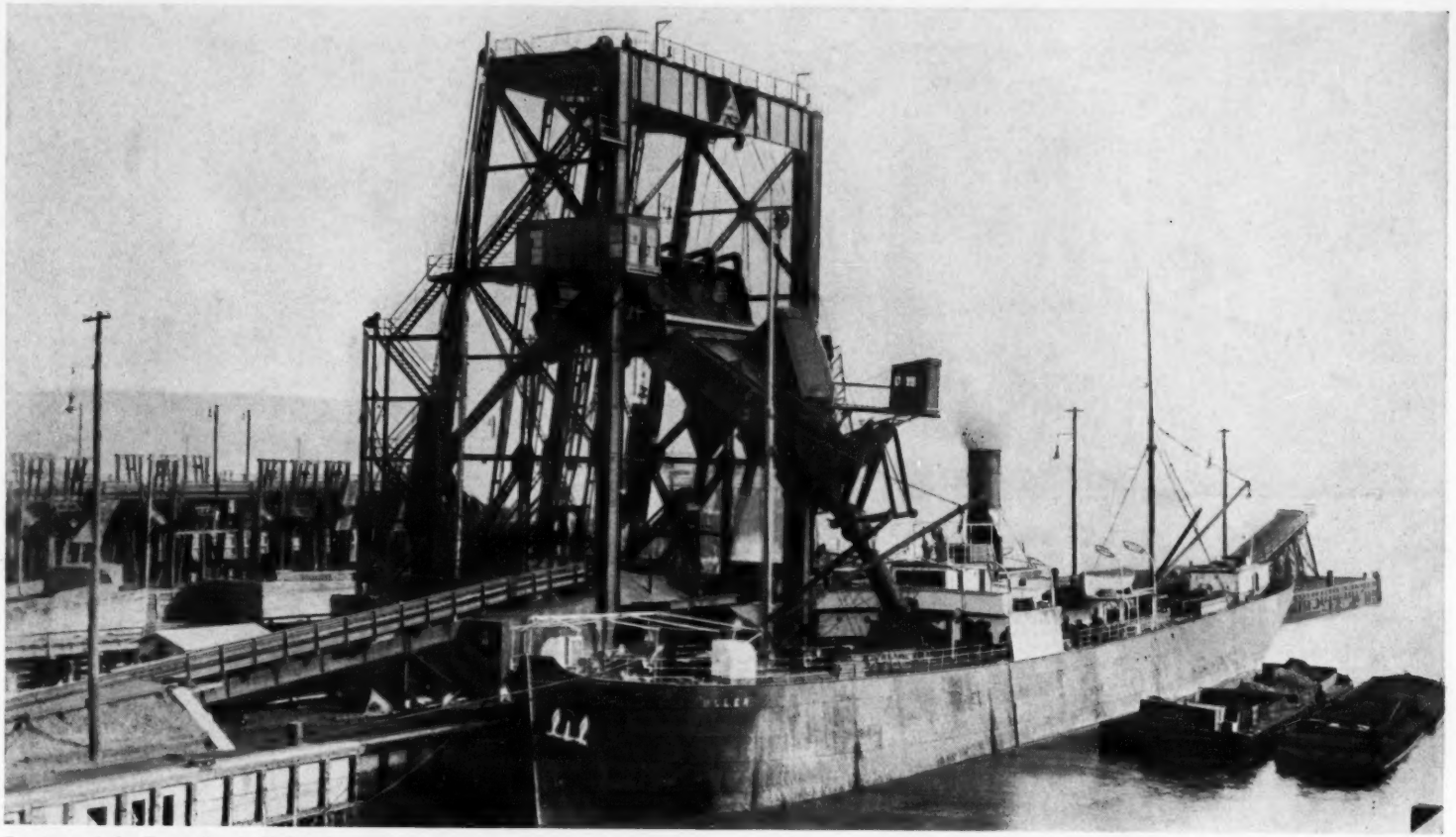
Passenger engine built to produce the most effective practicable combination of sustained speed and great tractive power. Driving wheels 80 inches in diameter. Weight with tender, 467,890 pounds. Starting tractive effort 44,460 pounds. This is Pennsylvania Railroad standard engine for heavy through passenger service, except where conditions require use of "M-1" type. Pennsylvania Railroad design. Built at Altoona Works.



Courtesy of the Pennsylvania Railroad

Steam Locomotive Type "1-1s" (Freight)

Pennsylvania Railroad standard heavy freight engine. Weight in working order, with tender, 582,100 pounds. Driving wheels 62 inches in diameter. Starting tractive effort 90,024 pounds. The engine photographed was built by the Baldwin Locomotive Works, of Philadelphia, from Pennsylvania Railroad design. Many locomotives of this type have also been constructed by the Pennsylvania Railroad at Altoona Works.



Courtesy of the Pennsylvania Railroad

COAL UNLOADING MACHINE, GREENWICH POINT, PHILADELPHIA, PENNSYLVANIA

This dumper can place coal into the hold of the vessel at the rate of a 50-ton carload every minute and a half. Operating at maximum speed, it is capable of transferring from cars to ships nearly 40,000 tons of coal daily. It picks up the heaviest loaded coal car, raises it 20 to 40 feet or more, turns it nearly upside down and dumps its contents into a "pan," which resembles a flattened funnel with one side removed. The coal then passes into the tube of the funnel, or chute, which is directed into one of the hatches of the ship that is being loaded. The slip adjoining the pier is dredged to a minimum depth of 30 feet at low water, which will accommodate the largest ship that can navigate the Delaware River.

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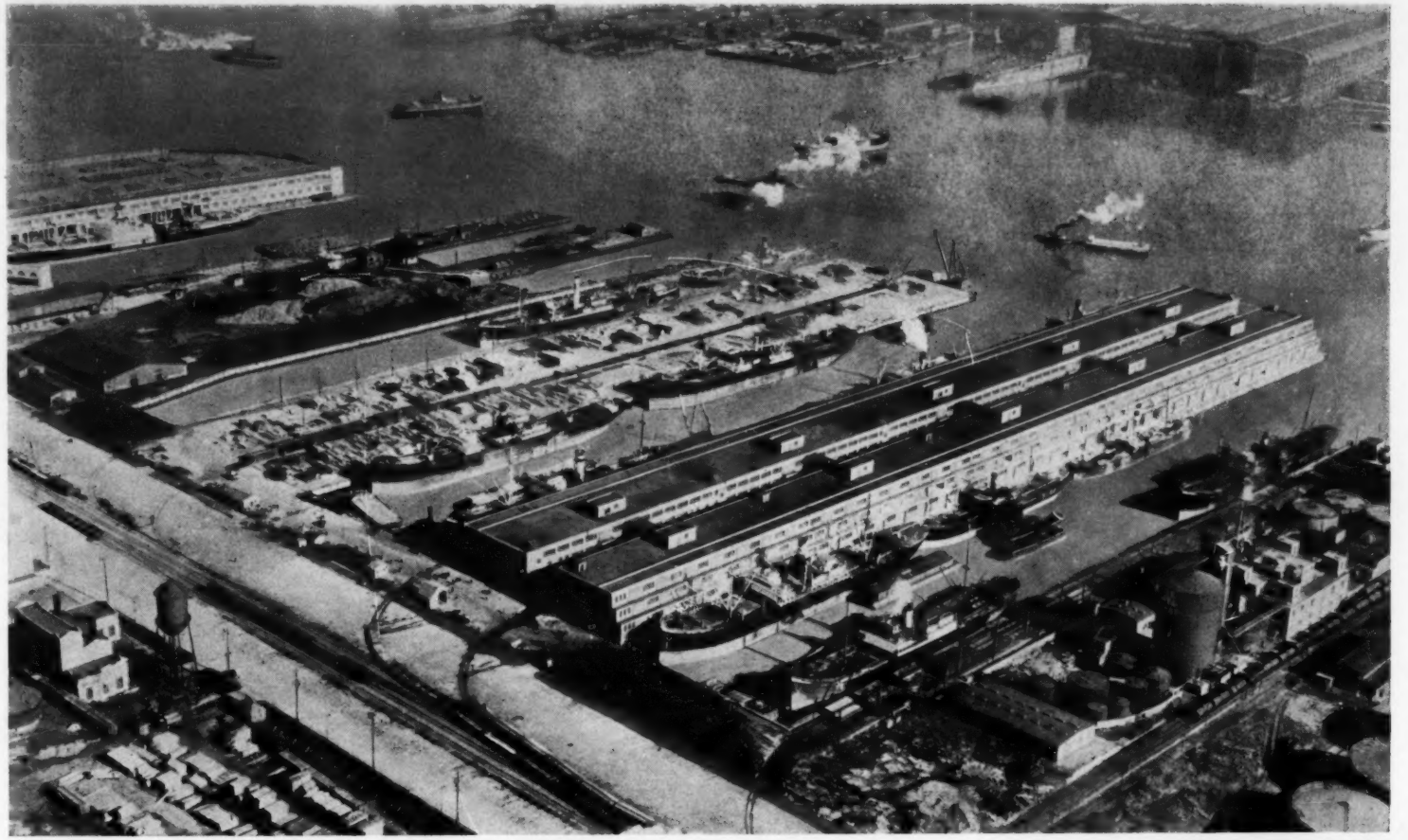
Courtesy of the Pennsylvania Railroad

BALTIMORE WATERFRONT

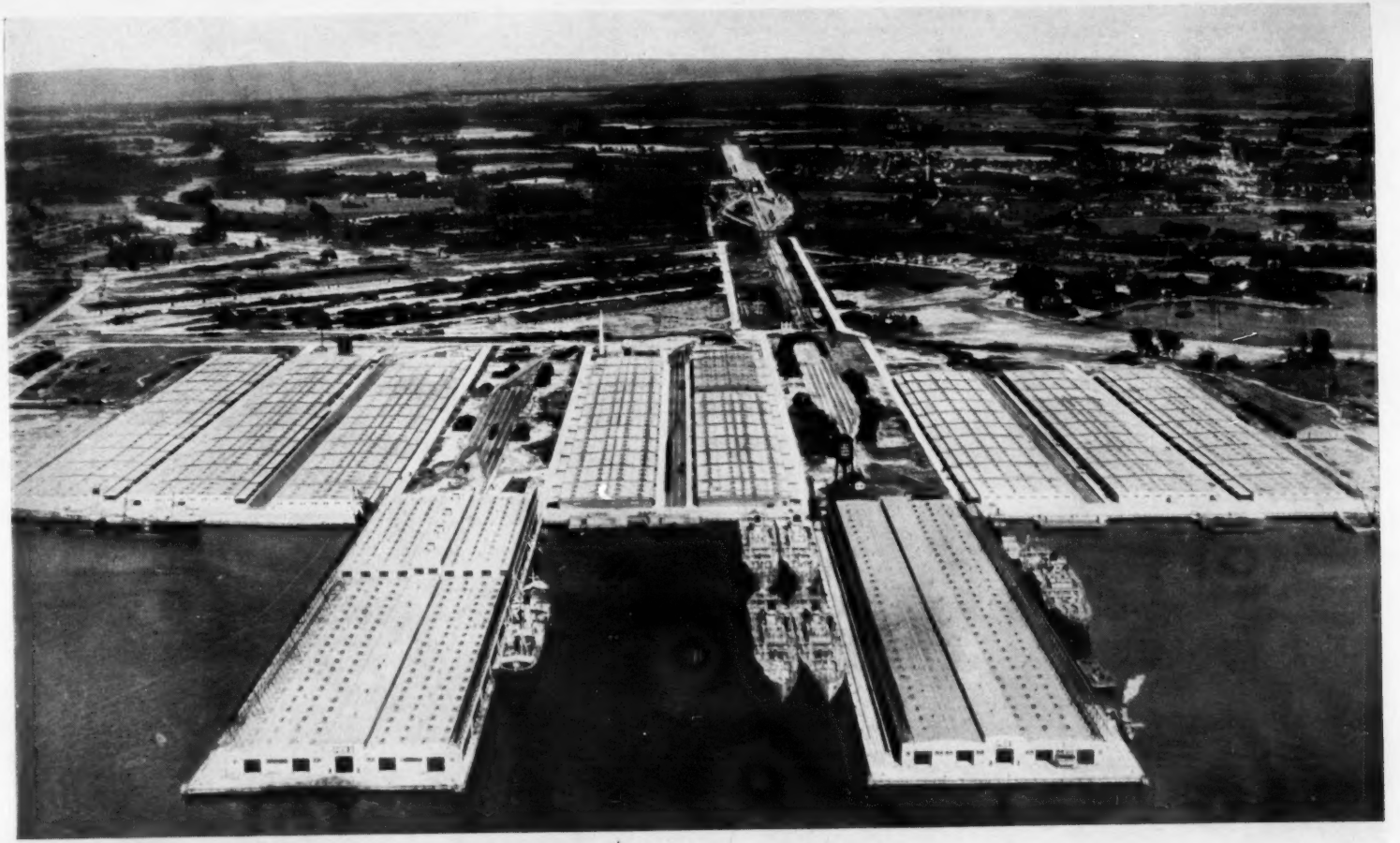


Courtesy of the Pennsylvania Railroad

PHILADELPHIA TIDEWATER TERMINAL

Courtesy of the Pennsylvania Railroad

PHILADELPHIA TIDEWATER TERMINAL



Courtesy of the Pennsylvania Railroad

NORFOLK TIDEWATER TERMINAL

Official photograph, U. S. Navy

U.S.S. "LAMSON," DESTROYER
Like an arrow in flight.

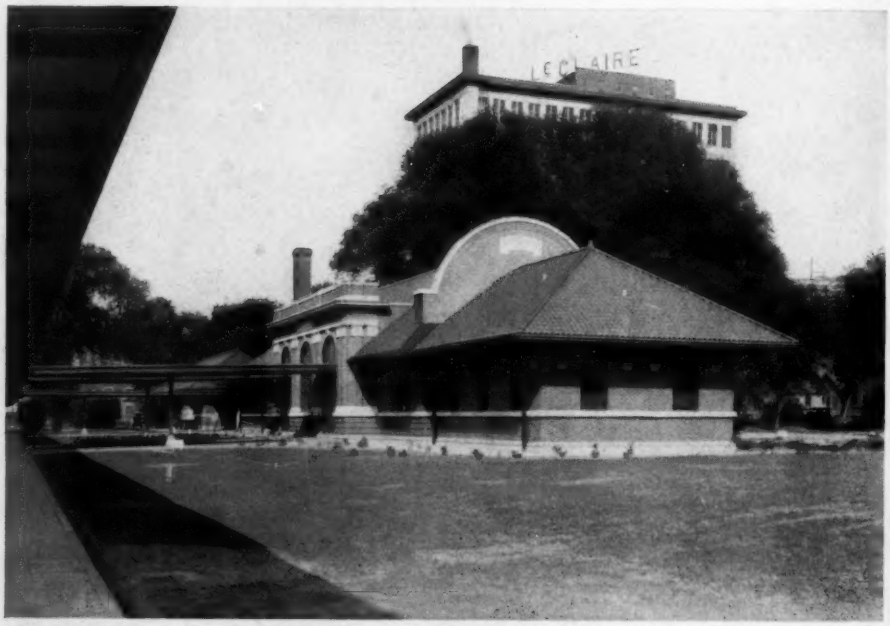
Official photograph, U. S. Navy

U.S.S. "LAMSON," DESTROYER
Like an arrow in flight.

Courtesy of the Chicago, Rock Island and Pacific Railway Company

FLEET OF NEW GAS-ELECTRIC MOTOR CARS PLACED IN SERVICE BY THE ROCK ISLAND LINES

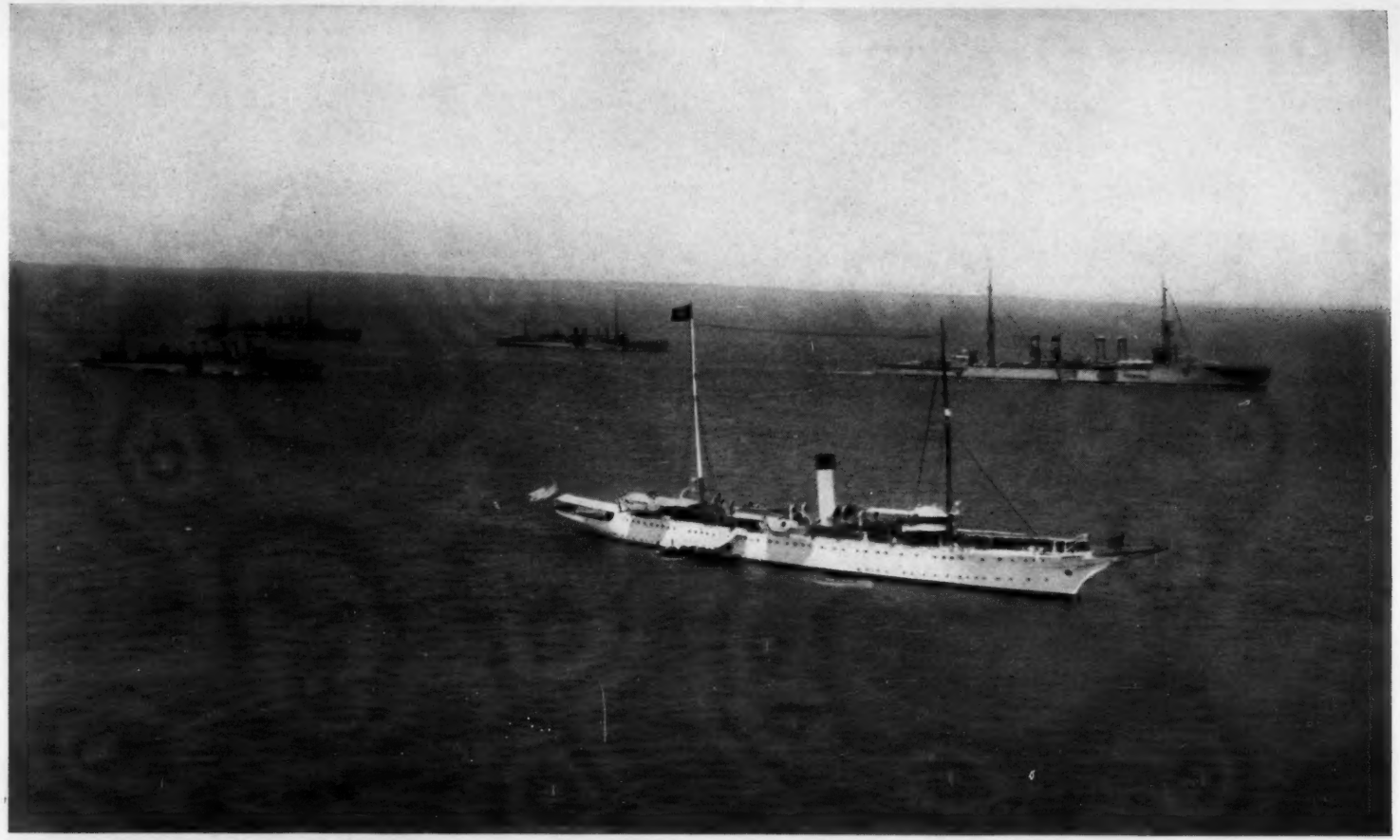
STATION AT FAIRBURY, NEBRASKA



Courtesy of the Chicago, Rock Island and Pacific Railway Company

DEPOT AT MOLINE, ILLINOIS

These illustrations show what the Rock Island Lines are doing to beautify their stations wherever possible for the benefit of the traveling public.



Courtesy of the Navy Department, Washington, D. C.

U.S.S. "CONCORD," LEADING DESTROYER SQUADRONS, SCOUTING FLEET, PAST THE PRESIDENTIAL REVIEWING SHIP, THE U.S.S. "MAYFLOWER," IN THE FOREGROUND, FLYING THE FLAG OF PRESIDENT COOLIDGE

Courtesy of the Navy Department, Washington

PRESIDENT ROOSEVELT AND EXPERT GUNPOINTERS ON BOARD THE U.S.S. "MISSOURI," 1906, AT CAPE COD BAY

The President took a great interest in Naval Gunnery and at the graduation exercises at the U. S. Naval Academy, May 2, 1902, in addressing the young officers about to joint the fleet, first used publicly the words, "The only shots that count are the shots that hit."

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Commerce *and the* Flag

By THE HONORABLE CURTIS D. WILBUR
Secretary of the Navy

IT IS commerce, with its means of communication, that has placed the lips of every American to the ear of every other citizen and has demanded friendship and understanding. Commerce then, has played a great part in our union. The foresight of our fathers in placing the regulation of interstate commerce in the union, and in prohibiting the imposition of import and export duties between the states, and in removing all obstacles, natural and artificial, to commerce between states, has furnished to us a bond of union which holds with constantly increasing tenacity.

As our nation has been knit together in its material and moral interests by its interstate commerce, so it has been joined by its foreign or international commerce. Just as the intrastate and interstate commerce have knit an almost inextricable union, so our foreign commerce is also an inseparable bond of union. Goods from the northeastern states mingle with the farm products of the middle west in outgoing goods—and our imports coming through the same great ports, reach to the uttermost parts of the union; and the freight rates we pay to move coal, or corn, twenty miles along our railways are affected by the volume of exports and imports passing over this part of the railway line.

The ships of all nations entering and leaving our ports with freight and passengers, as they pass back and forth from one world port to another, are like shuttles weaving bonds of international interest and friendship and joining all who furnish the exports or consume the imports in a common bond. So also our interstate and transcontinental trains are daily and hourly moving back and forth, weaving in closer union the people of the several states.

If we are justly to estimate the United States, we must consider not only the land it occupies and the rails and wires of commerce connecting them, but also the invisible lines of inter-communication drawn across trackless oceans by the ships carrying our goods along the ocean lanes of commerce, and also the others freighted with messages, as well as the telegraphic cables hidden in the ocean depths, but nevertheless carrying from land and sea with inconceivable speed the wants and wishes, the hopes and desires, the casualties and catastrophes of one people to another. This visible and invisible network of international trade and communication is as much a part of the United States as the soil we till. It is a part of our nation as truly as our hand is a part of our body and the circulation of our blood, and the net-work of our nerves which feeds and moves the cells of our body are a part of us.

Nor need we look alone to these invisible tokens of union. Americans have over 20,000,000 tons of merchant shipping to carry the commerce of the world. At $150 per ton they would be worth $3,000,000,000. This is about equal to the value of all the property in the United States at the time of the Revolution. We have loans and property abroad, exclusive of Government loans, of over $10,000,000,000. These two items alone equal the entire value of the entire property of the United States in 1857. Thus,

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The President took a great interest in Naval Gunnery and at the graduation exercises at the U. S. Naval Academy, May 2, 1902, in addressing the young officers about to joint the fleet, first used publicly the words, "The only shots that count are the shots that hit."

if you had floated every farm and town lot, every manufacturing plant, and every home, every bank and every dollar in them out onto the broad waters of the seven seas in 1857, you would not then have had so large a stake on the sea as our citizens now have on it or across it. If we add to this the volume of exports and imports for a single year—about $10,000,000,000—we now have an amount almost equal to the entire property of the United States in 1868, and if we add to this the $8,000,000,000 due us from foreign governments, we have a total of $31,000,000,000, being about equal to the total wealth of the nation in 1874.

These vast interests must be considered when we talk of defending the flag. That flag must be defended unhesitatingly and with all our power whenever attacked. It makes no difference whether it floats from an army post in Montana or from an American ship in the harbor of Calcutta or Sitka. We have always rallied to the defense of our flag, even if far from our shores when attacked. When England searched our ships on the high seas, and removed seamen protected by that flag, we struck for freedom, whether the act was done in the sunny Mediterranean, the turbulent North Sea, or the broad Pacific. Sea battles were fought on the seven seas in this war. And although our shores were invaded and our Capitol at Washington burned by the enemy, these sea victories far from our shores won peace and safety to the country. France attacked us at sea, and at sea we retaliated. The Barbary States struck at our flag, and after miserably yielding tribute for a time, we finally rallied to the call "Millions for defense, but not one cent for tribute." We sent our ships, few in number, to contest with those piratical states for freedom of commerce upon the Mediterranean.

In the Civil War we found our ships fighting off the coasts of France and in the Pacific to maintain the flag of the Union upon the high seas. The Spanish-American War found our ships, within a month after war was declared, fighting in Manila Bay, on the far side of the Pacific, sending monitors across the Pacific to meet the new Spanish fleet, transporting troops to the Philippines, to Cuba and Porto Rico, and destroying the naval power of Spain at Santiago. The World War, with all its philosophical and historical basis, furnished a clear instance of violated commercial rights and of our defense thereof. We fought, not because Germany invaded or threatened to invade America, but because she struck at our commerce on the North Sea and denied to our ships and to our citizens on the high seas the protection of our flag, as she had denied the protection of other neutral flags.

To defend America we must be prepared to defend its interests and our flag in every corner of the globe. If our minister is assailed in Pekin, our marines march to his assistance. If our consul is slain in Teheran, Persia, we demand and receive redress and our ships go to the boundaries of Persia to receive and acknowledge apologies and reparation. If our citizens and soldiers are slain by marauders across the Mexican border, we take and hold Vera Cruz until a more stable government takes over power. Piracy has been wholly suppressed upon the high seas and our gunboats are patrolling the Yangtse River for a thousand miles inland to suppress piracy there. If trouble is threatened in Samoa, our ships there seek to secure justice for the inhabitants. Our Navy knocks with friendly hand upon every door and exchanges greetings of friendship with every people. Its potential power holds up the hands of every consul, minister, diplomat and plenipotentiary as he transacts the affairs of state.

De Tocqueville, in his work on the American Democracy, in 1835 made the following prophecy:

> Reason and experience prove that no commercial prosperity can be durable if it cannot be united, in case of need, to naval force. This truth is as well understood in the United States as anywhere else; the Americans are already able to make their flag respected; . . . . At present, the commercial states are connected with others which are not commercial, and which unwillingly behold the increase of a maritime power by which they are only indirectly benefited. If, on the contrary, the commercial states of the Union formed one and the same nation, commerce would become the foremost of their national interests; they would consequently be willing to make great sacrifices to protect their shipping, and nothing would prevent them from pursuing their desires upon this point.
>
> Nations, as well as men, almost always betray the prominent features of their future destiny in their earliest years. When I contemplate the ardor with which the Anglo-Americans prosecute commerce, the advantages which aid them, and the success of their undertakings, I cannot help believing that they will one day become the first maritime power of the globe. They are born to rule the seas, as the Romans were to conquer the world.

I have deliberately chosen to direct attention to America as a world power with world-wide commercial interests and with inescapable commitments and obligations in order to call attention to the necessity of an adequate Navy for national defense. Joined with this must be a realization of the importance of building up a merchant marine that will properly serve the needs of our country in peace and in war.

Today our merchant vessels are carrying about thirty-two per cent of our foreign commerce; it should be at least fifty per cent. The remaining sixty-eight per cent that is carried in foreign bottoms means that we pay annually about $600,000,000 to other countries for transporting our goods. A greater portion of this we should ship in our own bottoms, and so retain a large part of this vast sum at home. What is paid to foreign ships for carrying the products of our farms and factories is a stream of gold that leaves the country. That which is paid to our own merchant vessels circulates back into the country to take its part in general industry. The ships required for such a commerce would be built, repaired and provisioned at American sources and would give employment to many of our citizens. Surely this would add to the general welfare, and at the same time provide the vessels and experienced seamen so essential to any country in time of war.

It is evident, in view of the amount we annually pay to others for carrying our goods, that our country can well afford to give substantial aid to our overseas shipping in order to place it on a permanent operating basis that will enable it to compete successfully with foreign shipping. Such aid is given by our chief competitors on the sea to their shipping. They understand that their commerce thrives best when supported by an active merchant marine. Government aid abroad to shipping, combined with the lower cost of building and operation, when compared with costs in this country, make a differential that is difficult for our shipping to overcome. Herein lies the problem to be solved. A wider general knowledge by the citizens of the United States in regard to the importance of the sea to the future prosperity of our country is essential to the solution of this question.

The greater part of the ocean tonnage which the United States possesses was hastily built during the war and is now idle. Such ships as are in service are competing against more modern vessels, of better cargo facilities and speed, built since the war. It is a case of a task being done with old tools, when in competition with those supplied with modern tools and devices. There is need of a comprehensive merchant ship-building program, that our flag may be maintained on the lanes of overseas commerce. Germany today has almost regained her total prewar merchant tonnage; and over sixty-nine per cent of this total tonnage is less than five years old. This illustrates what a determined nation, which realizes the importance of the sea, can accomplish in a short period of time.

The farmer and manufacturer must realize that they are interested in the maintenance of an adequate merchant marine under the American flag. When shipping conditions are upset, as was the case during the World War, the factories of New England suffer through the lack of coal. The products of farm and factory may be piled high at port terminals, rotting for the lack of ships to carry them to their destination. Even a coal strike in another country can affect the prosperity of the farmer in the United States, through the deflection of ships that ordinarily would be available to transport the wheat and cotton crops. If we are dependent on the ships of others, our farmers may suffer at any time through the lack of shipping to reach the foreign markets; and at the same time will be forced to pay such ocean freight rates as the foreign shipping interests may choose to dictate.

The United States today is a great exporting and importing nation. The margin of our prosperity rests on our foreign trade. In food values we import more than we export. From every corner of the globe we draw raw materials essential to our industries. It is not the part of wisdom for us to be dependent on our competitors to serve us with ocean shipping. Where would you find one department store turning over the delivery of its goods to a competing department store with the expectance that it would be equally successful in business? In such matters it is necessary to reserve a considerable independence.

The merchant marine, essential to the economic development of our country in time of peace, becomes a vital element of national defense in time of war. Its building up and development with vision and resolution is a subject of importance to every citizen.

Naval Aviation *and its* Common Interest *with* Air Commerce

By The Honorable Edward P. Warner
Assistant Secretary of the Navy for Aëronautics

AVIATION in the United States has sailed for some years past in troubled waters in which commercial aviation and military flying alike were but struggling for a foothold, seeking to establish themselves on a basis of solid usefulness while wild torrents of controversy and charge and counter-charge raged around them. It is possibly the proper occasion of a little surprise, and certainly an occasion for more than a little gratification, that despite those difficult conditions steady progress has been made. It has come to be a matter of general knowledge now that the American Air Mail Services arouse the envy of the world. It has come to be universally recognized that the products of the American aircraft industry challenge comparison with any others. It requires but a superficial examination into the subject for the layman to realize that he may take an equal pride in the record of aviation in his Navy.

Through the post-war period of readjustment, when the armed services were returning to a peace basis and when the Navy was being scaled down in size, there was but little opportunity for increasing the number of airplanes or naval aviators, yet the operations undertaken were constantly changing their nature and developing into an increased usefulness, and the spirit of the service was manifesting itself through a steady improvement in efficiency. On June 30, 1921, there were 370 naval aviators in the service, and during the year ending on that day the hours of flight had totaled 37,248, an average of 101 hours for each officer qualified as an airplane pilot. The average number of naval aviators on duty during the fiscal year 1923 had decreased to 320, but the hours of flight for that year rose to 43,300, an average of 135 hours as against the 101 of two years previously. Two years more saw a further increase to a total of 64,000 hours of flying (including the Marine Corps), a mean of 155 hours for each naval aviator, while during the fiscal year just ended the total ran to the astonishing figure of over 100,000 hours, an average of well over 180 hours per officer pilot. The total number of airplanes available for the naval service was remaining almost stationary, due to the rapid retirement of war-time stock, while the hours of flight and number of flights were being substantially trebled in the course of five years. It happens that the number of airplanes on hand in the naval service on September 30, 1925, was almost identical with the number on June 1, 1927, yet of those available for service on the earlier date, approximately sixty per cent had been designed in 1918 or earlier, while in June of this year, only twenty months later, that proportion had decreased by more than a half. By the time this article appears in print the proportion of war-time airplanes will have dropped to scarcely twenty per cent, and within another year, in all sizes and for all purposes, they will have ceased to be an appreciable factor.

Within another year or two it will be impossible longer to speak of the total of equipment on hand as remaining constant. The most modern equipment will be delivered from now on, even more rapidly, as airplanes of the war period and of other obsolete designs are cancelled from the records. The airplane is firmly established not only as an indispensable part of the Navy's activities afloat and ashore, an integral unit of the fleet without which a commander-in-chief would be grievously, and perhaps fatally, handicapped in emergency, but also as an independent instrument of scouting and defense against enemy activity upon the sea in the event of war. It is in recognition of that new and growing importance

that the Department has drawn up and recommended, Congress has authorized, and the responsible officers are now putting into execution, a program which will carry the total number of naval airplanes of modern type and useful in the event of war from its present figure of about 500 up to an authorized level of 1,000 as the result of purchases made up through the fiscal year of 1931.

The appreciation of the vital significance of naval aviation which has led to these grants of power and these expanding plans for the future has itself been the result of repeated demonstration of the capacities of aircraft. Those demonstrations have been possible, and the doubling and tripling of the amount of operation per man and per machine has been accomplished, in part because of developments in aëronautical engineering science and improvements in the equipment available, but mainly because of the continuous and concentrated efforts for making of a better record on the part of every man attached to any aviation unit. That same improvement in equipment and that same keenness for raising the standards still further has shown itself also in an increase of over 100 per cent in the safety of naval aircraft operations within the last four years, so that in the past year the hazard among naval officers and men piloting airplanes corresponded to but one fatality for every 8,400 hours of flight by the individual. Put in other terms, despite the considerable increase in the average amount of flying done by each man engaged in naval aviation in the past few years, there has been no corresponding increase in the proportion of those aviation specialists suffering death or injury by airplane accidents.

The growth of commercial aviation in the United States in the past year has been vastly encouraging, and it is to be expected that it will continue until non-military flying totally over-shadows in amount the total of military and naval operations. As yet, however, the number of miles flown in a year in the naval service is nearly double the total for all the air mail and passenger lines in the United States. The very vastness of the experience amassed in fifteen years of operations working up gradually to so considerable a scale made it possible for naval flying and naval flyers to be of the greatest service to the commercial operator and to those engaged in developing equipment for commercial service.

It is worth recalling that seaplanes were used, and the operation was an over-water one, in the first commercial airplane passenger service started in the United States, if not the first in the world, a line which ran across a bay in Florida about 1912. Those who have followed the history of aviation will readily remember, too, that the first serious attempt at commercial passenger carrying after the war was made with seaplanes on a Key West-Havana run, and that routes between Cleveland and Detroit and between New York and Atlantic City succeeded to that one.

The commercial operation of seaplanes has suffered a temporary eclipse during the past few years, but both fundamental logic and observation of European experience indicate clearly that the seaplane possesses important advantages for a wide range of commercial operation over ocean, along rivers, over large inland lakes, and even possibly over the land where lakes and streams are frequent. Public attention has been forcibly turned to over-water flying in general, and to its particular problems, by the remarkable flights of Lindbergh, Chamberlin, and Commander Byrd, as well as by Commander De Pinedo's trips in which he has used a seaplane over land and water indiscriminately. This growing interest in maritime aviation in commerce and in airplanes designed especially to meet its needs naturally increases the bond between commercial and naval flying, for practically all the large flying boats that have so far been built in the United States have been built for naval use, and the design of a commercial seaplane now would depend upon the experience that has been gained in that work and upon the extended researches conducted upon the forms of hulls and floats at the Washington Navy Yard during the past decade and a half.

The profit to commercial aviation from naval operations is, however, by no means limited to those services which employ seaplanes. Aside from the fact that a very considerable proportion of the Navy's own work is done with landplanes operating either from the shore or from the decks of aircraft carriers, there is a community of principle and of practice in many of the elements in the design of all heavier-than-air craft, whether intended for over-land or

over-sea work. All modern airplanes in fact show the result of service experience at many points in their design.

Out of the sums appropriated for naval aviation in the past few years, there has been an annual average of about $1,750,000 allocated to experimental and research work. Since studies on the development of armament and other purely military equipment are carried under other sub-headings of the appropriation, the bulk of that sum is available for experiments conducing directly to the production of improved airplanes, engines, propellers and aëronautical accessories, and of the amount so spent there is hardly a dollar which will not ultimately pay a good return in benefit to commercial aviation as well as to the naval service. The primary function of aëronautical research in the Navy, as of every other naval activity, is to keep the whole plant and its operating personnel set for action in any emergency. It frequently happens, as in this case, that in fulfilling that obligation as scrupulously as possible there is incidental return in the form of important benefit to some industrial or commercial activity. The quest for such incidental return cannot be a guiding motive of policy, but when it appears it offers cause for gratification. The proverbial two birds are brought down with the proverbial single stone, and the taxpayer's dollar brings in a double dividend, a regular return in the national defense and an extra one in other directions.

It is not alone in the conduct of researches that the Navy's aërial activities serve air commerce. In addition to spending $1,750,000 each year upon experiment, the Navy has had during the past three years an average of about $12,500,000 annually to put into new airplanes and engines, and that has served directly and indirectly to sustain the industry whence emanates the equipment of the air transport route. Such support is of special importance to the engine builders, for unlike the construction of an airplane, which can be carried out in a small shop and with but few special tools, the building of a satisfactory aircraft engine requires a highly organized factory with much expensive equipment and correspondingly high over-head costs.

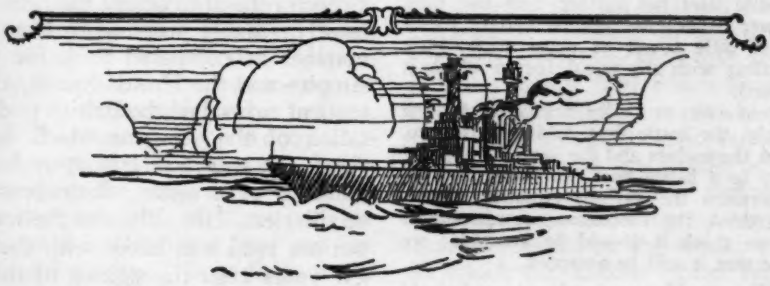
The best example of this service rendered to commercial aviation by the upkeep of an industry on service orders is afforded by the history of the power plant which carried Lindbergh, Chamberlin, Byrd, and Maitland to success, and which drove more than three quarters of the commercial airplanes entered in the recent national air tour. That engine was first built to suit naval requirements, and was first purchased by the Navy, and for several years it was upon naval business that the development work was fostered and the overhead expense carried, while commercial orders were few and far between. Without the support of the service the process of incubation and of gradual growth into the wonderfully successful product of the present day could hardly have taken place at all, or, if it had been carried on by some means, the cost of the engine to the commercial buyer would have been almost prohibitive. Because there was assurance of a substantially steady service demand the price could be kept down, and the engine could make its way in a field where economic competition as well as inherent performance had to be considered. So successful has it been in finding a place there that it seems likely, extending forward the tendencies of the last two or three years, that the commercial orders for such power plants will soon bulk larger than those for the government services. When that point is reached it will be the Navy and Army which will in turn reap the benefits of economy from factory production on a scale larger than would be possible if it were only government orders that had to be filled.

The improvement of equipment does not depend upon research alone. After a product has been brought to the stage of readiness for the market its further improvement depends largely upon experience with it in service and upon the correction of the minor ailments appearing from time to time during ordinary operation. Manufacturers of equipment widely disseminated in the hands of private owners have always to contend with the difficulty of getting specific information on the troubles encountered and the conditions under which they manifest themselves. In naval operation, however, airplane and engine and all their equipment are subjected to heat and cold, salt air and every other arduous condition, yet at the same time they are assured of competent attention, and there is exact and specific record of anything that goes wrong. The operations of naval aviation, aggregating a distance flown

each day nearly equal to that around the earth at the equator, serve as a laboratory on a grand scale for focusing the spotlight upon the weak points of material and providing the manufacturer with specific information upon which he can rely in seeking cures for the defects.

The operation of air routes, as well as the safe use of airplanes across country or over sea in commerce or in the hands of private owners, depends upon ground organization. There must be terminal facilities and provision for refueling and charts and aids to navigation of varying sorts. The Department of Commerce has now embarked upon the task of laying out and maintaining air routes and their accessories, but as the work of that department gradually progresses the traveler by seaplane still finds himself dependent to a considerable degree, as he has been very largely dependent in the past, upon aid from naval sources. The Hydrographic Office, active for many years in the service of those who go down to the sea in ships, has promptly taken an interest in travelers by air, and prepared the first of American charts intended for the special needs of the coastal seaplane voyager, together with an air pilot which is the air yachtsman's guide and his Bluebook of the aërial highways along the coast, carrying as it does both maps and complete compendia of information likely to be useful to the pilot choosing a port for refueling or other purposes. Furthermore, the naval air stations themselves are harbors of refuge for civilian travelers by air, and in case of need when no commercial facilities are available, the air stations can supply fuel and mechanical assistance to speed the traveler on his way. Again, an activity planned solely with reference to the needs of the Navy as a part of the national defense is proving an important utility for those who employ the airplane in commerce, for personal travel, or purely for pleasure.

Through fifteen years since naval officers began to fly, aviation in the Navy has grown stronger and stronger, and its relative importance in naval affairs has steadily increased. During all that time the work done has been laying the foundation for a commercial aviation, of which the coming was very gradual at first, but which in the last two years has sprung up like Jack's legendary beanstalk. Naval flying is being further developed under the five-year program act, and it is our confident expectation that it will continue to develop, but we confidently expect also to see the commercial use of aircraft expand until it goes far beyond the limits of their naval and military employments. As that happens the naval service can claim, and should in justice receive from the public, a good measure of credit for the commercial reaction of the work that has been done in the past and that will be done with the funds provided in the years immediately to come. As it comes to pass, too, the national defense will be favorably affected in turn by the creation in commercial aëronautics of a potential reserve of personnel and by the building up and maintaining in strong and active condition of that aircraft industry, the strength and activity of which is among the most vital of single factors in aërial preparedness.



Why *the* United States Asks Naval Equality

By WALTER BRUCE HOWE
President of the Navy League of the United States

THE position taken by the United States government in recent years with respect to the strength of the Navy it shall maintain is that it should have a Navy equal to that of the British Empire and stronger than Japan in the ratio of 5 to 3. This policy was first enunciated by Secretary of State Charles Evans Hughes at the Washington Conference for Limiting Naval Armaments which met in 1921.

Although the Washington conference failed to bring about an all-inclusive warship limitation, the 5-5-3 ratio was cheerfully accepted by both the British and the Japanese.

Lord Balfour, speaking on behalf of the British Empire delegation at Washington, said, with reference to the American proposal to limit every type of warship according to the ratio:

> We have considered it with admiration and approval. We agree with it in spirit and in principle. We look to it as being the basis of one of the greatest reforms in the matter of armaments and preparations for war that has ever been conceived or carried out by the courage and patriotism of statesmen. . . . .
>
> They have, as we think most rightly, taken the battle fleet as the aggressive unit which they have in the main to consider; and in the battle fleet you must include those auxiliary ships without which a modern battle fleet has neither eyes nor ears, has little power of defense against certain forms of attack, and little power of observation; little power of dealing with any equal foe to which it may be opposed.
>
> Taking those two as really belonging to one subject, namely, the battle fleet, taking those two, the battleships themselves and the vessels auxiliary and necessary to a battle fleet, we think that the proportion between the various countries is acceptable; we think the limitation of amounts is reasonable; we think it should be accepted; we firmly believe that it will be accepted.

Admiral Baron Kato, speaking on behalf of Japan, said:

> Japan deeply appreciates the sincerity of purpose evidenced in the plan of the American Government for the limitation of armaments. She is satisfied that the proposed plan will materially relieve the nations of wasteful expenditures and cannot fail to make for the peace of the world.
>
> She cannot remain unmoved by the high aims which have actuated the American project. Gladly accepting, therefore, the proposal in principle, Japan is ready to proceed with determination to a sweeping reduction in her naval armament. . . . .
>
> Japan has never claimed nor had any intention of claiming to have a naval establishment equal in strength of either the United States or the British Empire. Her existing plan will show conclusively that she had never in view preparation for offensive war.

The consideration which led Japan to accept a lesser strength than that of the United States was the now famous Article XIX of the Washington treaty which prohibits the development of naval bases in the Philippine Islands, Guam or the Aleutian Islands.

With an actual ratio of 5-5-3 then, it would be extremely hazardous for the United States to undertake a war in the western Pacific. On the other hand, an Asiatic power would be at a disadvantage operating near our coasts. That was the theory which led to the Washington treaty limiting naval armament.

But the 5-5-3 ratio applies only to capital ships and aircraft carriers. Due to the French refusal to accept the ratio of 2.5 (the most favorable proposal to France) in submarines as compared to 5 for the British Empire and the United States, and the consequent refusal of the British to discuss limitation of the weapons which fight submarines, the way was left open for unlimited building of cruisers, destroyers and other auxiliaries. Not only was the way left open but the road was taken with the result that five years after the signing of the Washington treaty the 5-5-3 ratio was only a phrase which bore little relation to actual naval strength.

In the post-conference building activity, the United States was left far behind. When therefore, Great Britain, Japan and the United State met at Geneva at the invitation of President Coolidge in June, 1927, the American proposal was simply to extend the capital ship ratio, already fixed by treaty to all classes of warships. It asked for a return to the spirit of Washington which had been accepted in principle by the other powers.

The American people, judging by editorial utterances from hundreds of papers, are well-nigh unanimous in support of the official American position at Geneva. It is in keeping with our pacific intent: equality to prevent aggression or unjust treatment of American citizens, trade or property in any part of the world and at the same time equality to avoid fostering suspicions and fears among other peoples.

Many considerations enter into the determination of our need for a Navy equal to the strongest. Among them may be enumerated our population, wealth, foreign trade, ocean-borne coastwise commerce, out-lying possessions, national policies, foreign investments and geographical position.

The latest estimate of the population of continental United States is 115,000,000. In the Philippines and other outlying possessions are an additional 12,000,000. In comparison with other peoples the American standard of living is high, the general level of education is good. Self-government prevails. Behind the wall of our defenses, if they are maintained, we shall be able to work out our lives and problems free from the interference of any other powers.

The population of the other naval powers is as follows: Italy, 45,000,000, practically all in Europe; France, 100,000,000 of which 40,000,000 are in the home country; Japan, 80,000,000 of which 60,000,000 are Japanese; and the British Empire, 440,000,000 of which about 315,000,000 are native Indians. The United Kingdom has 43,000,000; Canada, 9,000,000; Australia 7,000,000; South Africa 6,000,000; the Irish Free State 3,000,000; and New Zealand 1,200,000; or about 70,000,000 in the home land and the self-governing dominions. In addition to the 315,000,000 of native Indians who are British subjects, there are about 40,000,000 African blacks under the British flag.

In national wealth the United States has by far the most to protect—something over 400,000,000,000 of dollars. The British Empire has about one-third as much; France one-sixth; Italy one-tenth; and Japan about six per cent.

The foreign trade of the United States now approximates that of the United Kingdom and is close to $10,000,000,000 annually. The foreign trade of Japan is about $2,000,000,000 annually. While France and Italy have large continental trades the ocean-borne commerce of these countries is comparatively small.

Of all the principal naval powers Great Britain is the least self-sufficient, particularly with reference to food supply. In the event of a war with a non-European power, however, the British Isles could readily draw food and supplies from the continent. In the event of a war with an European power the British naval superiority, fixed by treaty for capital ships at three times stronger than either the French or the Italians and actually much stronger than this ratio compared to any European power, would secure her communications across the Atlantic.

The United States, on the other hand, has, with the exception of her trade with Canada and Mexico, to depend on long ocean lines of communication. And while we produce the greater part of our food supply, it must not be forgotten that we import food stuffs in excess of the food we sell.

Food, however, while one of the considerations, is not the most important to us. The United States Army War College has prepared a list of materials essential to American industries and particularly necessary in making war. It includes over two dozen articles which are not produced in continental United States or produced in negligible quantities. The list includes chromium and manganese, essential in the production of high-grade machine steel and armor; hemp, jute and manila fiber which have many uses but the most important of which is in harvesting and shipping crops; rubber for automobiles, airplanes, gas masks and a hundred other uses. Antimony, nickel, platinum, quicksilver, tin and tungsten are some of the metals essential to the machine civilization on which the United States has placed its dependence. Wool and silk are textiles in the same class. Essential medicines of which we have no supply are opium, quinine,

camphor and strychnine. Few of these materials have satisfactory substitutes.

In addition to the foreign trade of the United States, now of equal importance with that of Great Britain, the United States has an ocean-going, coastwise trade equalling in volume its overseas foreign trade. This does not include Great Lakes shipping which, in itself surpasses either our overseas foreign trade or our ocean-going coastwise trade. The purely coastwise trade of none of the principal naval powers begins to approach it. The trade of Great Britain with the dominions and colonies is considered foreign trade. The intercoastal trade of the British Isles, which must traverse exposed waters, is not great.

Combining, therefore, our foreign trade and our ocean-going coastwise trade which may be subjected to hostile naval attack we find that the trade of the United States on the seas is greater than any other nation, even including that of the British Isles plus the considerable interchange among the British dominions and many colonies. That our ocean-going commerce is greater than that of the British will be surprising no doubt, to many.

A moment's consideration will show that the enormously valuable coastwise shipping of the United States calls for naval protection. Long distances are traveled in carrying it. Ten million of tons of our coastwise shipping pass through the Panama Canal each year, which means that the minimum voyage for this tonnage is over 4,000 miles.

Furthermore, it is trade which could not readily be transferred to inland highways. Coastwise shipping is largely long haul shipping. Motor trucks could not undertake to carry the cotton from Galveston and New Orleans to the New England mills; or Alaskan or Washington lumber to New York. Neither could the railroads handle this great increase in business, nor any large part of it. During the World War our railroad facilities were overtaxed. Since the war our population has increased nearly ten per cent but railway mileage has not increased at all. Cessation of our coastwise shipping would merely mean that 80,000,000 tons of needed materials and food would simply not move.

All of America's coastwise trade is carried in American bottoms. Only about a third of our foreign trade is transported under the American flag but considering the value of our exports and imports, and the number of items essential to our industries, it is evident that such merchant marine as we have must be afforded ample protection. In the event of hostilities the American merchant fleet would be inadequate to supply ships to the naval train and at the same time move essential products across the oceans. Every ship sunk would be a telling loss. Nations, however, which have a surplus of merchant vessels employed in carrying cargoes for foreign countries would not be so critically circumstanced.

Our geographical position, with long coast lines bordering the two oceans, the vital strategic value of the Panama Canal and the desirability of affording protection to the far-distant Philippines are considerations which are generally acknowledged as calling for an American Navy equal to the strongest.

National policies, long established and generally accepted, such as the Monroe Doctrine, the "Open Door" in China, the freedom of the seas, cannot be maintained by good intentions alone.

The investment of American capital abroad is conservatively placed at $25,000,000,000 including about $10,000,000,000 advanced to the Allies by the government during and immediately after the war.

Despite the oft-repeated assertion advanced abroad and frequently at home, that we are impregnable, self-sufficient, with lines of communication protected and immune from hostile attack, the fact is that we are much more dependent on the outside world than is generally realized. Certainly our high standards of living and the actual necessities of millions of our workers are contingent on the uninterrupted flow of our foreign and coastwise commerce. It is easy to say we produce enough food to sustain our population. The United States has many mouths to feed. We are part of a highly organized society. Interruption of rubber imports would throw many thousands of workers out of employment. Cessation of cotton and wheat exports would mean privation to millions of farmers. It would be small consolation to them to know there was food somewhere but not in their reach. Our well-being, if not our lives, is bound up with the outer world. Amply able as we are to provide the protection which our position de-

mands, it behooves the United States to maintain a navy equal to the strongest.

Such a navy as has been intimated above makes no threat of aggression but secures the lives and property of Americans not only at home but wherever they may be throughout the world. The first purpose of the Navy is not, as generally supposed, to fight and win battles. It is to be so obviously able to support the policies of its government that these policies will be given respectful attention and acted on according to their merits and not be brushed aside because of the impotence of the nation to support its policies.

With such a Navy America will be secure and will be an agent of stability in a troubled world. The United States Navy is at all times directed and governed by the civil authority. The civilian president must send it on its most minor operation which affects another country. Only Congress can declare war. After that it is the business of the Army and the Navy to bring about peace.

Public opinion in the United States would not permit of the unjust employment of our military forces even if it were the desire of the administration so to employ it. Certainly public opinion in America on this point can be trusted to demand fairness as well as public opinion in any other country.

The situation then, as regards wealth, ocean-going trade and foreign investments, is that the United States has most at stake. So far as fully enfranchised citizens are concerned the United States is, also, in the lead. We have one fleet to protect continental United States on two oceans and to safeguard the Philippines, Hawaii and the Panama Canal. Furthermore, we have the money to maintain the fleet without noticeable hardship to our tax-payers. The price of one picture show from every American each year in addition to the present naval budget would provide the difference nicely!

The Sea-Borne Commerce *of the* United States

By ADMIRAL E. W. EBERLE, *U. S. Navy*
Chief of Naval Operations

THE national wealth of the United States is estimated to be well over $400,000,000,000. Our annual export trade is close to $5,000,000,000. It is approximately the same as the export trade of Great Britain, and exceeds the export trade of any other country. Not only does our annual export trade equal or exceed that of any other nation but, in addition to this export trade, the value of our coastwise trade, excluding the traffic on the Great Lakes, is greater than the value of the total foreign trade of any other nation. Otherwise stated, the value of our foreign commerce plus the value of our coastwise traffic is more than twice the value of the foreign commerce of any other country. Our coastwise trade extends from Maine to Alaska, covering a distance only slightly less than that from England to Australia.

Our commerce extends to the nations of all countries and all climes. Our products penetrate to the jungles of Africa and South America as well as to their highly civilized centers of population. Our trade with European countries is of the greatest importance both to them and to us. We have no trade agreement with Russia and have not recognized their present form of government, yet it has been the subject of frequent comment that our trade with Russia is greater than that of Great Britain with Russia.

Our products are sold in the interior of China as well as along the coasts. Our commerce with Japan is probably of more value to that country than her exchanges with any other single nation.

American automobiles, to mention only a single product, are found in the populous centers as well as the remotest outposts of civilization in every country on earth.

The report of the Department of Agriculture shows that the value of foodstuffs imported into the United States exceeds the value of the foodstuffs which we export. It is fortunate that in foodstuffs essential to maintain life the United States is at present self-sustaining, but it will be noted that the people of the United States now consume more foodstuffs, by value, than they produce.

Large quantities of raw materials essential to the industrial life of the nation are imported into the United States. An interruption of the supply of such products as rubber, tin, manganese, nitrates, etc., would seriously handicap our factories and, in certain industries, such an interruption, if extended over a period of several months, would result in partial or complete stoppage of production.

The insular possessions of the United States, our investments abroad, our shipping and other trade facilities overseas, aggregate a value of nearly $50,000,000,000.

Briefly stated, the national wealth of the United States is greater than that of any other country, her sea-borne commerce exceeds that of any other nation, and her foreign interests and investments are second to those of no other nation on the face of the globe.

In the past, thought of our sea-borne commerce has often been restricted to thought of the merchant ships under the American flag. We have heard much of the necessity of protecting our merchant ships, but little of the vital importance of protecting our goods in transit on the ocean, whether carried in American or in foreign bottoms. The protection of our goods in transit and the right to ship them freely, to and from all parts of the world, is a matter of paramount importance to the people of the United States; the protection of ships

flying the American flag and engaged in this transfer of goods is incidental to the protection, while in transit on the sea, of all the multitudinous products of our factories, farms, and mines.

Overseas commerce is carried only in part in ships flying the United States flag, a large proportion of our products are carried in foreign bottoms. It is evident that in peace-time trade agreements will, in a large measure, be dictated by the group controlling transportation.

In other words the nation that furnishes transportation (ships) has in its hands a powerful factor in peace-time overseas trade. In war-time such a nation has in operation a merchant fleet which continues to transport goods of all description to and from the home country in order to supply the needs of the population; transports the raw and manufactured materials essential to the conduct of war; transports supplies of all description for the fleet; transports men and munitions overseas. The merchant fleet also augments the actual fighting strength of the fleet by the addition of fast liners mounting six-inch guns. Such ships make very efficient fleet units capable of engaging successfully any type of warship except the capital ship and the cruiser mounting eight-inch guns.

Thus a vast merchant fleet constitutes in itself a powerful element not only of fleet strength, but of the strength of the nation both in peace and war. In computing the strength of navies or nations the capabilities of the merchant fleet constitutes a factor which must be carefully evaluated.

Since the number of ships in our merchant marine permits only a portion of our enormous sea-borne commerce to be carried in American bottoms, a greater national force is required to protect it than would be necessary were it all carried in American bottoms. This is true not only because an increased number of merchant ships under the American flag would add directly to the national and naval strength, but also because governmental control can readily be exercised over ships flying the American flag both in peace and in war.

Our interests which are dependent upon sea communications are of such magnitude that it would be criminal folly to depend, for their protection, upon any agency other than the strength maintained by our own government.

The Farmer *and the* Merchant Marine

By Rear Admiral Luke McNamee, *U. S. Navy*
Commander Destroyer Squadron, U. S. Battle Fleet

THE American farmer is the backbone of the country. There is no doubt about that. Practically everything that we eat comes out of the ground and if it were not for the farmer, who slaves early and late to see that it does come out of the ground, we would soon stop eating. The farmer is a producer, most of the rest of us are middlemen, manipulators, consumers; all necessary to carry out the functions of our complicated civilization, but not all of equal importance. It is well for some of us to realize where we stand and not get too puffed up over our jobs. The farmer's job still ranks first, the United States is still essentially agricultural though it is rapidly becoming industrialized. One reason for this is that our factories, protected by a tariff, are still able to flourish on domestic consumption and reap an additional profit by selling their surplus production at a small profit abroad. This is true only where mass production reduces the labor cost below that of foreign competition. We cannot and should not attempt to compete against foreign countries in crafts requiring skilled hand labor. Our wage scale and standard of living make such competition unprofitable. We must compete in agriculture. We cannot avoid it because the value of our largest crops is determined by the price set on our exported surplus in competition with that of other countries.

Under the best conditions risk of failure is great. Agriculture has always been unorganized and uncontrolled. Due in part to inherent conditions such as climate and weather as well as to lack of coöperation among farmers themselves and specialization in crops, it is one of the most speculative fields of endeavor; it rivals Wall Street. The farm oscillates between fat and lean years, depending on the weather for good crops and on ability to market good crops at a price fixed by a foreign middleman under conditions over which the farmer, or indeed any American, has no control.

Our farmers are above the average in intelligence, but I doubt if there are many who have taken the time to analyze the situation and find out just why these depressing conditions exist. I doubt if many follow in thought the carloads of wheat out past the village buyer, over hundreds of miles of railroad whose freight charges and operating conditions are regulated by laws—all kinds of laws designed to control everything that happens to that shipment of wheat while it travels over a part, but only the land part, of its journey to the foreign consumer whose existence creates the demand that makes it possible for the farmer to dispose of his product at a profit.

When these carloads of wheat reach the seaboard do they find an American ship protected and regulated by American laws, as are the railroads, ready with tracks laid across the sea to every port in the world to take that wheat where it will command the best price and where it can be exchanged for raw materials and articles that are not produced by us and which will give a return cargo to our ships? They do not. Seventy per cent of that wheat, at least, must be placed on foreign ships, which will take it where it can be exploited by foreign agencies and foreign interests that are not our interests, and the farmer will get whatever that foreign middleman broker decides to give him. That is because we have only thirty per cent of the ships necessary to carry our freight and are in danger of losing even them.

So, if the farmer analyst is logical, he will be driven to the conclusion that the basic cause of his troubles is his inability to control the marketing of his surplus production and that this inability is due to the lack of a national merchant marine. Now let us go into the matter a little further; the whole

question of national prosperity is bound up in this marketing of surplus production.

If a farmer raises 10,000 bushels of wheat and can eat only 1,000 bushels he is no better off than his neighbor who raises only 1,000 bushels, unless he can sell that surplus 9,000. That 9,000 bushels represents his margin of prosperity over his neighbor. He can exchange that 9,000 bushels for luxuries —for tea, coffee, cigars, fine English woolens and French fripperies for his wife— while his neighbor, without a surplus, must sit at home and eat his bread in misery without butter or molasses.

To prosper he must raise more than he eats and sell the surplus. The more he sells at a profit the more he prospers. The trouble comes when home consumption is satisfied, the domestic market saturated; no more wheat can be used at home and additional wheat thrown on the market breaks the price and down goes the price below the cost of production. That is where the shoe pinches. In a good year there is bound to be a surplus that must be shipped abroad where, in Liverpool for instance, it will be bid for in competition with wheat from the Argentine, South Africa, or Australia. England is the great middleman. By owning and controlling the bulk of the shipping of the world she controls the ability of other countries to deliver their products other than through the elaborate machinery of distribution, finance, brokerage, insurance, repair and port facilities she has built up all over the world. Each takes its toll and in the end the farmer gets the price, the net price, mind you, after all these shipping costs are deducted from the price quoted, not by American buyers in the United States, but by English buyers in Liverpool. The price of all wheat is based on the price paid for the surplus.

Some years there may be small crops everywhere with world shortage, prices go up and there is a general rush to increase production. The next year brings a bumper crop and grain becomes too cheap to pay for harvesting. It can be shown that with reasonable facilities for storage there is never really a world surplus that cannot be handled. Nine times out of ten it is inability to distribute the surplus due to lack of suitable transportation and commercial agencies. Famine and urgent need for food are always with us and present too in countries filled with raw materials for which we are clamoring and which are available in exchange for our food.

As stated before, agricultural production is uncontrolled. The government advises against overproduction, but little heed is given by the farmer. Inconsistently the government is spending millions in opening up new lands for the farmer as well as irrigation projects. These must enormously increase our surplus without the government taking care in advance to organize and establish a regular means of marketing this surplus abroad. The present administration is doing all in its power to remedy the shipping situation but, until the farmer himself realizes the cause of his troubles and makes his realization felt in Congress, it is doubtful if the problem will ever be completely solved.

The ability of the farmer to market his wheat crop at a good price depends on the amount that can be successfully marketed abroad. If we have not sufficient ships of our own to carry it and foreign ships are not available for a dozen different reasons such as coal shortage, strikes of seaman or dockyards, wars, troop movements, national interest and the like, that wheat may have to rot on the docks because there are no ships to take it. That condition actually threatened last year on account of the coal strike in England which deprived British ships of their fuel. Were it not that our Shipping Board pulled a large number of merchant ships, our own war product, out of rotten row and put them hastily in commission to carry that grain abroad, the farmer last year would have been out hundreds of millions of dollars. The credit for this brilliant achievement was due to the clear business foresight of the Department of Commerce, combined with the hearty coöperation of the Shipping Board.

Under present conditions there may be starvation in Russia, China, or India, millions crying for bread, but they cannot get our wheat because there are no ships to bring it to them and no agencies of our own to distribute it. We give away every year millions of bushels to starving peoples that could pay for it twice over if we had foreign business agencies properly organized to take care of it. With proper steamship lines under our own control we would have commercial agencies in those countries with ware-

houses, docks, fuel and repair facilities, and banks to finance their operation. These agencies would collect return cargoes to pay for our products; cargoes of raw materials that we need and do not produce—rubber, silk, wool, sugar, tea, coffee, hemp, tin, manganese, and a thousand other articles that enter into all our manufactures. Until we have learned how to import we will never be able to prosper on our exports, and we will never learn the import business till we have our own ships.

Wheat has been used as an illustration applying particularly to the farmer, but the analogy for any other product is apparent.

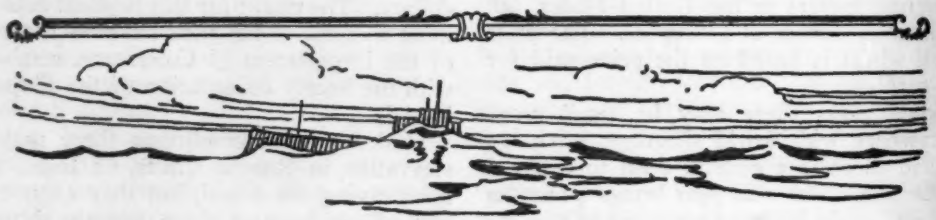
What we need most is ships of our own, ships that will serve our interests and not some other country's interests. We need not care for the present whether these ships operate under government ownership or private ownership so long as they operate in our interest and under our control. Any loss or subsidy paid by the government will be returned to the country a thousand-fold; not only in the freight charges and insurance premiums saved and kept at home, but in the prosperity it will bring to the farmer and the manufacturer.

The United States has progressed too far in civilization and prosperity to remain longer a dependent nation in the matter of transportation. We boast of our independence, but a country that is seventy per cent dependent on its foreign rivals for transportation is hardly worthy of the statue that stands a mute witness of our humiliation in the principal port of the country.

Inability to distribute our own surplus harks back to the stone age when a tribe feasted in one valley and starved in the next because life was cheap and road-making tiresome.

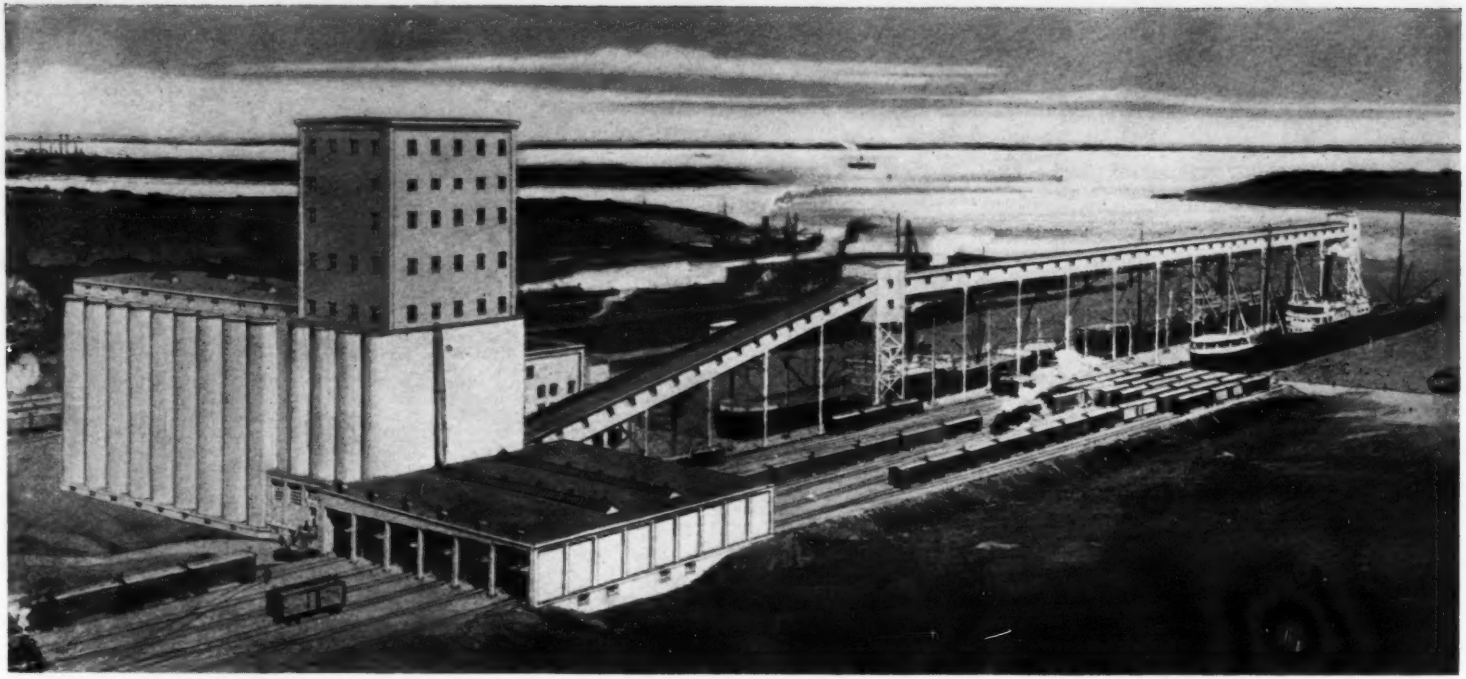
To sum up. The motto of this country for farm and factory, for every field of effort where mass production is possible, should be "surplus, surplus and still more surplus." We must issue a new Declaration of Independence and insist on distributing the great bulk of our surplus in our own ships and through our own agencies. Then we must insist on bringing home in exchange the raw materials for our factories, the fertilizers for our farms, and the luxuries that we do not produce for our families. In this way we can enjoy our prosperity, help our foreign neighbor, and take care of that bug-bear of economists—the balance of trade.

In the meantime we will have taken one of the most important steps to insure the national defense. We will have provided ourselves with a real merchant marine.



Courtesy of the Baltimore and Ohio Railroad Company

A Grain Elevator and Freight Terminal



Courtesy of the Pennsylvania Railroad

THE GIRARD POINT ELEVATOR

Located on the Delaware River, at the mouth of the Schuylkill River. Grain is delivered to ships for export by means of a conveyor gallery containing four conveyor belts, each with a capacity of 15,000 bushels per hour. The grain is delivered from either side of the pier through dock spouts into the hatches of the vessels. Space has been provided for three simultaneous ocean going steamships. The dock on one side is 900 feet long and on the other side it is 450 feet long with an ample depth of water for vessels up to 30 feet draft.

The track layout in the elevator yard will accommodate 1,400 cars. The elevator proper has a receiving capacity of 240 cars per day of ten hours.

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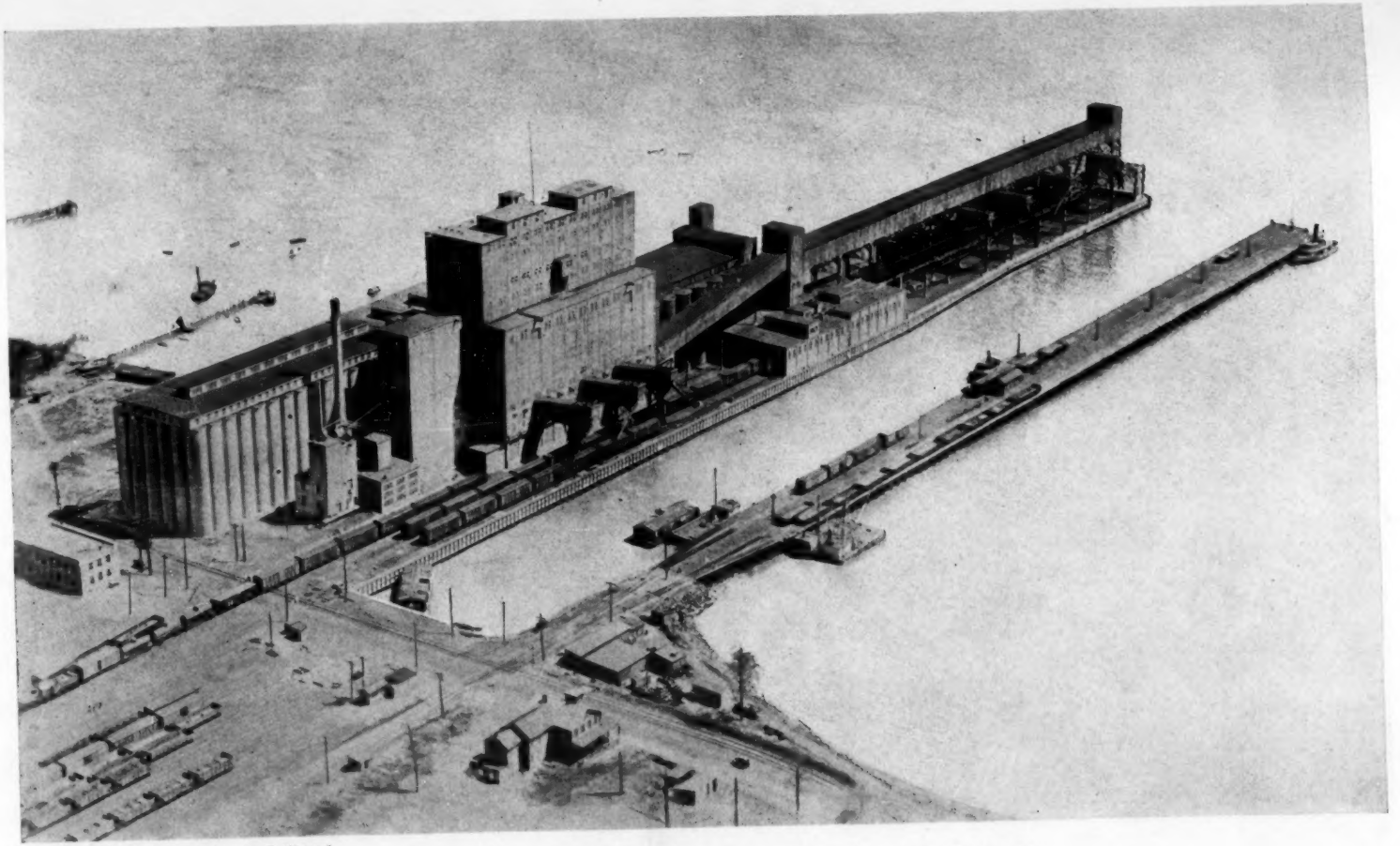
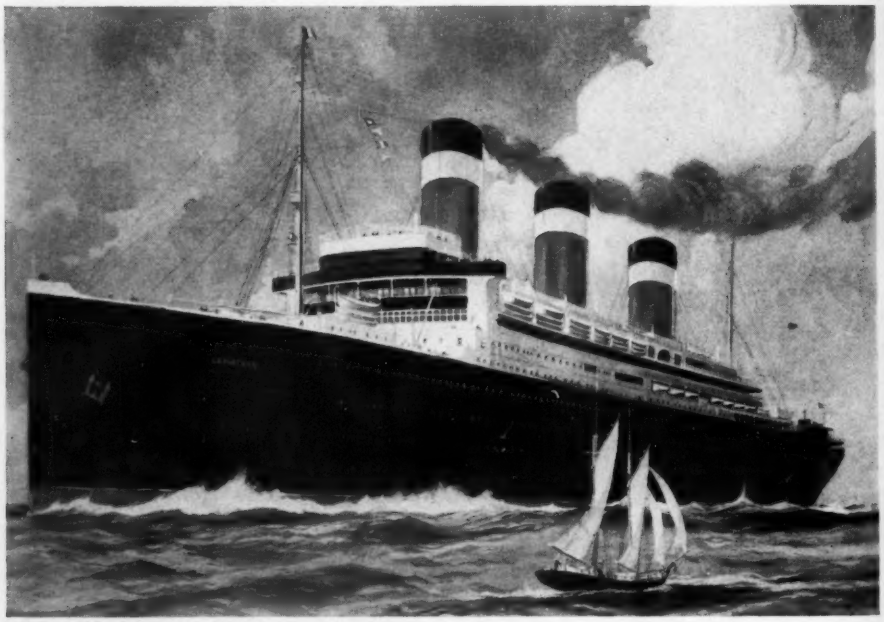


Courtesy of the Pennsylvania Railroad

P.R.R. Baltimore Grain Elevator. Largest on Atlantic Seaboard

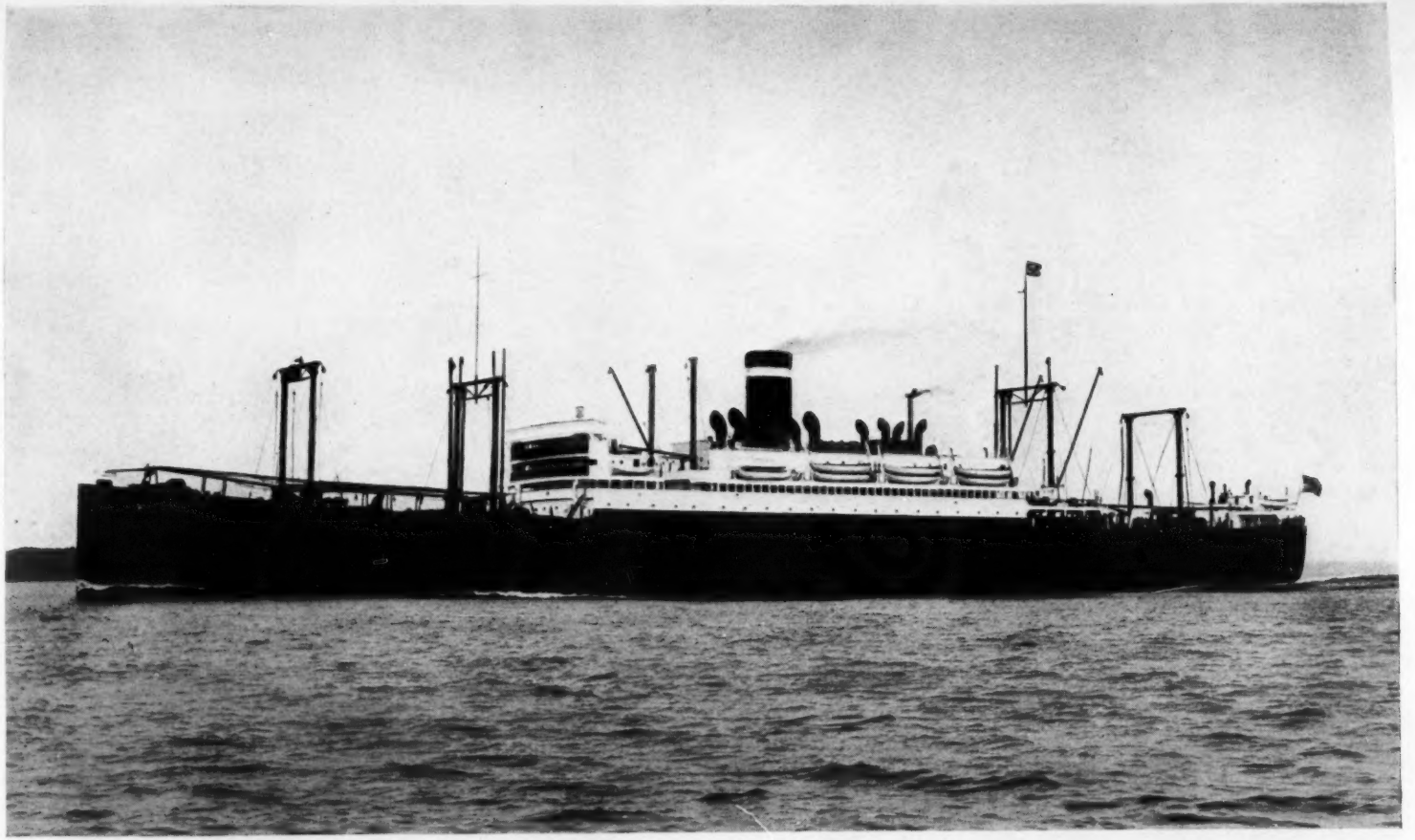
Courtesy of the United States Lines

TUGS DOCKING S.S. "LEVIATHAN"



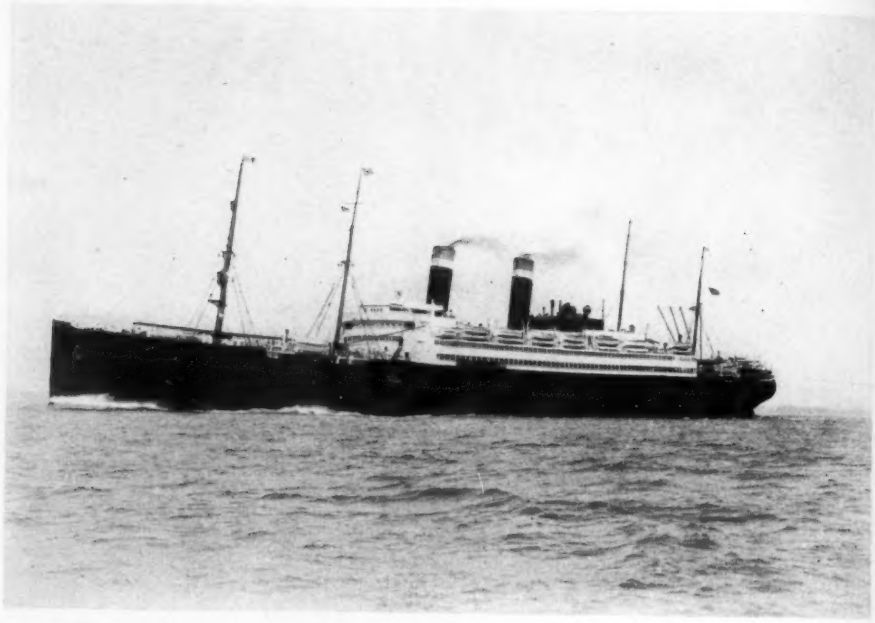
Official photo U. S. Navy

S.S. "LEVIATHAN"

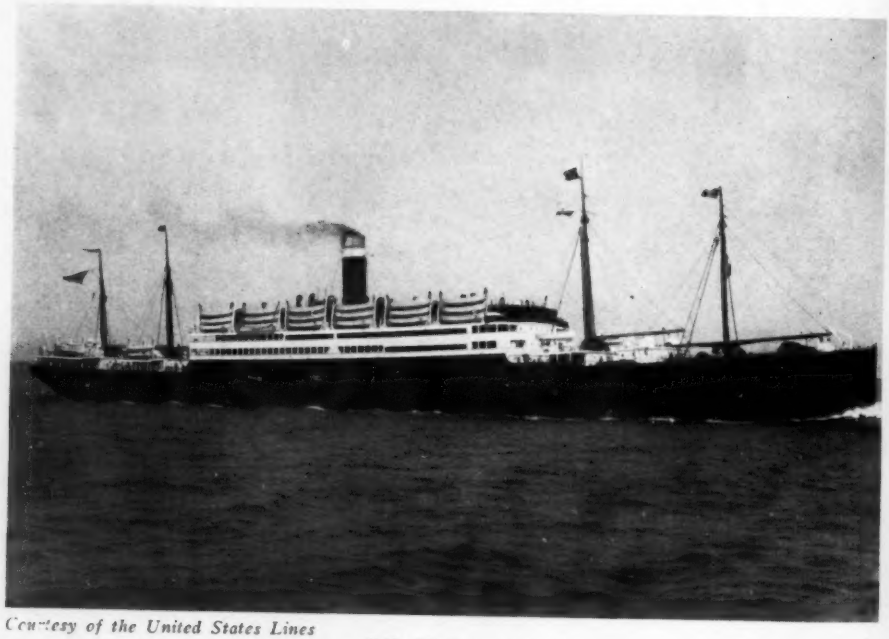


Courtesy of the United States Lines

S.S. "President Roosevelt"
The *President Harding* is a sister ship.



S.S. "GEORGE WASHINGTON"

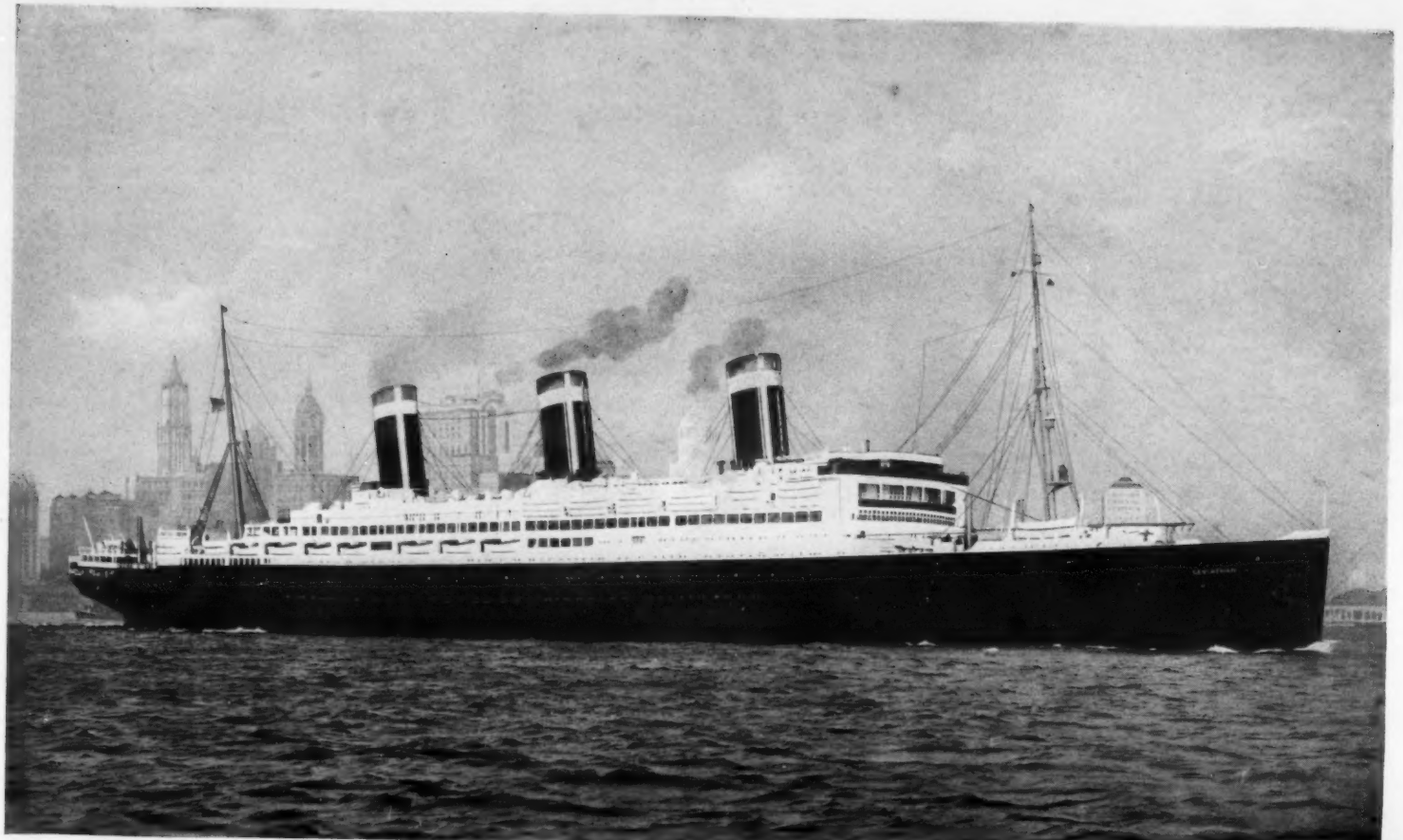


Courtesy of the United States Lines

S.S. "REPUBLIC"

Courtesy of the United States Lines

S.S. "AMERICA"



Courtesy of the United States Lines

S.S. "LEVIATHAN"

A National Merchant Marine *is* Vital *to* Our National Security

By BRIGADIER GENERAL A. C. DALTON, *U. S. Army (Retired)*
President of the Merchant Fleet Corporation

TO ASSURE adequate national security for the United States, consideration must be given not only to providing an adequate Navy and an efficient Army, but also to all those great industrial enterprises upon which our people must rely for their prosperity in peace and their maintenance in war.

National security, in peace as well as in war, is directly dependent upon national prosperity. National prosperity depends upon the development of our material resources, an efficient national transportation system, and the maintenance of a favorable trade balance in world commerce.

The progress of every nation along the highway of modern civilization may be accurately gauged by the extent to which it has adopted and adapted improved means and methods of mechanical transport, and the degree to which it has developed an efficient national transportation system.

The tremendous development of the natural resources of America and her attendant prosperity has been largely due to the creation of an efficient and economical domestic transportation system. Billions of dollars have been expended for the development of inland transportation, including our railways, canal and barge lines, interurban railways, and what has now become one of the greatest links in our transportation network, our national highways. Long before the advent of the railway, the development of the waterway and of the highway was recognized by the great European nations as necessary for national defense. The great highways of the Roman empire, and those of the Napoleonic era in Europe, were built primarily as national defense projects.

Every nation that has risen to a commanding place in the world has found necessary for the accomplishment of its greatness, and particularly for the extension of its foreign influence, not only a naval fighting force, but a merchant vessel service to carry its traders, its products, and its trade influence, to its over-seas dominions and possessions, to its spheres of influence, and to the trade marts of other nations.

History clearly indicates that nations have risen in their greatness or declined in their power and influence in world affairs in the exact proportion to which they have maintained not only their naval strength, but that commanding place in world trade which can be accomplished only through the medium of a Merchant Marine operating under their own national flag.

The outstanding nations of today are those that have acquired and maintained a commanding place upon the high seas. The power and influence of each of the nations and of the lands and peoples throughout the world may be accurately measured by the extent to which they are maintaining their naval supremacy and their own national merchant marine.

The United States of America cannot hope that in its national development it may be an exception to this general rule. Neither may we escape the fate of other nations who have lost their rightful place upon the high seas, either because of the hostility of other nations, or through the indifference and neglect of their own people.

A high naval authority in a recent public announcement stated that "Without an efficient Merchant Marine, no nation can maintain an efficient Navy." That this thought was in the minds of those who created the Shipping Act of 1916 is clear by the fact that the creation of a naval auxiliary, a naval reserve, and an American Merchant Marine were all considered of equal importance for the national defense.

S.S. "LEVIATHAN"

Courtesy of the United States Lines

The President of the United States has repeated in his messages to Congress the vital importance of an American-flag Merchant Marine.

In the message of 1923 we find the statement, "The entire well-being of our country is dependent upon transportation by sea and land . . . . We must have a Merchant Marine which meets these requirements and we shall have to pay the cost of its service."

In 1925 he again makes this clear by the statement, "The maintenance of a Merchant Marine is of the utmost importance for national defense and the service of our commerce." The necessity of our maintaining our proper place in international commerce is imperative.

The necessity of creating a Merchant Marine, privately owned, and operated as the railroads now are, doing its part in the movement of world cargoes, for our own people and for our commercial associates, is also so clearly imperative that this national need can no longer be relegated to the realm of theory or conjecture. This necessity is becoming more and more apparent as the pre-war productive capacity of the other progressive nations is gradually being restored, and world shipping and world trade conditions are returning to the normal.

The United States Shipping Board has created a nucleus for a future great American Merchant Marine Fleet. This fleet, composed of war-built vessels only, has an active operation of over 300 vessels. These vessels are operated by private companies, under governmental supervision, on twenty-four trade routes that reach nearly every market of the world. Supplementing this Merchant Fleet of government-owned and operated vessels, there have been sold to American citizens a large number of passenger and cargo vessels, and also complete Merchant Marine services, that are operating on world trade routes and in our intercoastal service. The United States Lines composed of six modern passenger vessels, with the great *Leviathan* as the flagship, is operated directly by the Merchant Fleet Corporation from New York to England, France and Germany.

The cost of the governmental operation of this merchant fleet is insignificant compared to the service which it renders to American producers and traders engaged in foreign commerce.

The total expenditure for the United States Shipping Board Merchant Fleet Corporation for the present year will approximate $16,000,000. This is but one-half of one per cent of the total appropriation made for the maintenance of the federal government; $94,000,000,000 was contributed by the federal government to aid the states in building our national highways during the same period; $75,000,000 was appropriated for the improvement of our rivers and harbors; $625,000,000 was expended for our Army and our Navy.

The direct value of this government-owned and operated fleet was shown by the service rendered our people when the majority of foreign flag vessels deserted the American shippers in the summer and fall of 1926, to engage in the movement of coal to Europe, when ocean freight rates on coal were trebled during the British coal strike.

The American farmers, mill owners, lumber dealers and manufacturers and cotton growers were able to ship their products on a free market at favorable prices while a vast amount of Canadian grain unable to find ocean tonnage for its movement was congesting Canadian ports.

The character of the service rendered by the Shipping Board fleet is indicated by the fact that from September to December, 1926, out of a total of 3,600,000 bales of cotton shipped abroad, 1,700,000 bales or forty-six per cent were handled by the vessels of the Merchant Fleet Corporation.

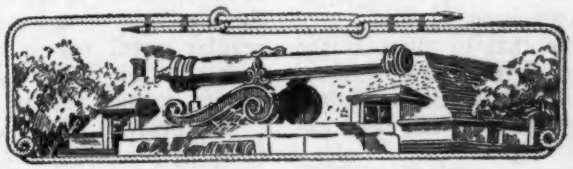
This merchant marine service of the Shipping Board has been an insurance against higher freight rates, and a guarantee of protection for American exports, which means larger profits for American farmers and manufacturers, more employment and better wages for American workmen.

A National Merchant Marine is Vital to our National Security. One need not be an expert in economics or in international trade to realize that world conditions have undergone a complete change during the past ten years, and that we can no longer consider ourselves as isolated and safe from foreign attack. If the imperative necessity of a competent Navy has been emphasized, the need of a Merchant Fleet as auxiliary and aid to such Navy cannot be ignored. Aside from the advantage to trade and commerce, the moral effect of a thoroughly equipped and well balanced Merchant Mar-

ine cannot be overestimated. We must not be deceived, however, in the thought that our present fleet of war-built vessels is sufficient; time and service wear on ships; changes and improvements have occurred in shipbuilding; foreign shipbuilders are forging ahead in the production of new and faster ships (and these ships are especially designed for service as Navy auxiliaries in time of emergency), so that the time is at hand when we, as a nation, must plan for the solidity, permanence and sufficiency of our Merchant Marine.

A National Merchant Marine is Vital to our National Security. Our foreign trade is growing year by year; it has become a potent factor in our prosperity and has been the means of developing closer contact and profitable trade relations with Nationals of other countries. It cannot be denied that our active operation of cargo ships in all important trade routes during the past eight years has had a strong influence in this trade development while at the same time developing permanent shipping services eventually to be operated by experienced American shipping companies. Let us not forget, however, that while we have progressively, persistently, and patiently forged ahead in shipping routes formerly controlled by ships of other nations, our position in such trade cannot remain secure unless we, either as private companies or as a nation, keep step with modern improvement in ship construction and make definite plans for replacement of ships which become obsolete through depreciation, and failure to keep pace with competition.

A National Merchant Marine to be effective must be *permanent*—it must be an accomplished and accepted fact. It must be a builder of trade in time of peace; an influence for peace in time of danger; a direct and effective aid in time of war.



A Plea *for the* Merchant Marine Naval Reserve

By REAR ADMIRAL R. H. LEIGH, *U. S. Navy*
Chief of the Bureau of Navigation

IN ORDER successfully to fulfill its mission in time of war, the Navy must thoroughly organize and prepare itself in time of peace. Preparedness is the keynote of its success and no part of the complicated naval structure can be neglected without detrimental effect upon the whole. In line with this preparation great sums of money have been expended in building, equipping and operating navy yards, fueling stations, radio stations, etc. This vast expenditure has been made primarily for the purpose of affording every facility for maintaining the efficiency of the fighting fleet in time of war. War preparedness is the only possible justification for these large expenditures. In peace times the functions of these establishments could be as economically performed through the ordinary commercial agencies, but in order to insure that the Navy will have available and under its control the facilities necessary for its operation when the emergency arises, these expenditures are authorized from year to year and there can be no question as to the wisdom of such a course.

History has shown that in all wars the nation which commands the sea is successful. The last two wars in which the United States has been engaged have not been exceptions to this rule.

Fortunately, in the last war, the combatant fleet of the enemy was so confined to its home bases by superior forces that the merchant vessels of all neutral wartime nations were available for use as transports and supply ships. It cannot be expected that this fortunate condition will always exist. In future wars the United States may be wholly dependent on merchant ships under its own flag for the necessary transportation and supply service until such time as mastery of the seas will permit the employment of vessels of neutral countries.

In these days of economy, it is neither practical nor necessary to maintain all combatant vessels on a full commission basis nor would it be practical or desirable to maintain the necessary auxiliaries as a part of the peace-time fleet. Provision must be made for the necessary auxiliaries in a national emergency by drawing upon the merchant marine of the country as the only source able to supply the necessary vessels and personnel.

All nations which support navies in times of peace have made provision for expanding these navies in national emergencies. Their combatant forces will include vessels which are, in peace times, held in reserve but will in national emergencies be manned by crews which have been trained in peace times for duty on these vessels. These crews are usually composed of men who have resigned from the regular service to engage in civil pursuits and of men who, with some training, have become qualified naval reservists. It is customary to maintain the efficiency of these men by means of practice cruises on regular naval vessels and they are therefore available in a national emergency for service on such vessels.

The practice of the various maritime nations in providing for the auxiliary ships and personnel so necessary in times of emergency will be found to be very dissimilar both in policy and scope. Some nations have by subsidy or by direct payment to the merchant ship personnel induced and encouraged the shipping interests to have their vessels and crews enrolled in the Naval Reserve. Other nations require a term of compulsory military and naval training from the men of suitable age and physique. In the United States the same necessity for preparation exists, but our experience has shown us that neither a subsidy nor compulsory training

are acceptable. Due to the extreme degree of economy which is practiced in the peace time operation of the Navy, a very complete and exacting plan of expanding both the combatant forces and the auxiliary ships and personnel is necessary.

The United States has followed the general practice in regard to the training of reservists for combatant vessels and has in training a comparatively small Naval Reserve which provides for the manning of additional naval vessels to be placed in full commission in an emergency. Congress has recognized the need of additional auxiliary vessels and personnel to be drawn from the merchant marine in time of emergency by passing a law creating the Merchant Marine Naval Reserve and providing a plan for the training of the personnel. This branch of the Naval Reserve has received but little recognition, and it is the purpose of this article to draw attention to this condition and to urge that prompt action be taken to remedy the defect. Congress has authorized compensation for the training of the Merchant Marine Naval Reserve by providing that when Congress has made available, in time of peace, the necessary funds for this specific purpose, officers of the Merchant Marine Naval Reserve may be paid in each year a sum not to exceed one month's base pay of their grade or rating in the regular Navy.

Unfortunately, Congress has as yet been unable to provide the funds so necessary for the operation of the excellent plan established by this law. Even though the estimates submitted by the Navy Department since the passage of this law in order to merely make a start in the development of this branch of the Naval Reserve, have been nominal (less than $50,000) the continued forced reductions in the estimates for the Navy as a whole have made it impossible up to the present time to secure any appropriation for this purpose. The last Naval Appropriation Bill carried the total of $319,650,075. When the fact is noted that in time of war the value of the merchant service used as auxiliaries to the regular Navy is generally conceded to be thirty per cent of the value of the regular Navy, it is to be regretted that the merchant marine branch has, so far, been entirely unprovided for. Of the above sum, $3,890,500 was allotted to the other two branches of the Naval Reserve (The Fleet Reserve and the Volunteer Reserve)—branches which have made good progress in their development while the Merchant Marine Reserve has modestly awaited its turn.

When Congress passed the law providing for this reserve, it very wisely stipulated that no man could enroll who did not follow the sea as a profession and a three-year absence from the sea terminated his eligibility.

No such rigid eligibility rules exist in any other branch of the naval service and these rules are ample insurance that the enrolled personnel will consist of practical seagoing men well versed in the requirements of their profession.

The deck officers are skilled in the handling of their vessels and are superior navigators and competent seamen. The engineer officers are practical seagoing engineers, skilled in their profession and able to operate and maintain their vessels under all conditions. They have no superiors.

Can anyone question the desirability of enrolling these men and giving them such naval training as will fit them for the part they must play as an integral part of the naval forces? It is obvious that best results will be secured with men acquainted with their ship and trained together. The Navy Department, therefore, plans the training on a "ship unit basis." Certain vessels have been selected as desirable for service as naval auxiliaries. These vessels have been chosen for different purposes; such as tankers, supply ships, transports, etc., and it is proposed to offer to the officers of these selected vessels a course of training which will fit them for the duties to be performed as officers of naval auxiliaries.

When money is available it is proposed to compensate these officers for the effort they must make in order to obtain the purely naval knowledge necessary for them as members of the naval service. This includes training in signaling, gunnery, etc., as well as a certain knowledge of cruising in fleet and convoy formation, fleet tactics, as well as a knowledge of administrative procedure, etc., so as to enable them to fit into a naval command in time of war. No instructions in the technique of their seagoing profession is planned for these officers.

It must be borne in mind that these officers must prepare themselves while carrying on their ordinary duties in the merchant service.

This training must not be allowed to interfere with the normal peace time activities of the vessels and no interference with the usual commercial duties of the personnel can be permitted.

The commandant of the naval district in which the vessel makes its home port will supervise the training and administration of the personnel in the Merchant Marine Naval Reserve. The master of the vessel, if qualified and enrolled, is to be the senior member of the unit and through him the training of his officers is to be conducted.

The ship unit plan seems to promise the largest return for the least outlay because in this method of organization and training the ship will be in a position to join the fleet as a complete unit with officers on board familiar with the ship, her equipment, characteristics and machinery.

The building of suitable vessels for the merchant marine is without the province of the Navy Department. While it must view with regret the present relative inferiority in numbers and types of vessels available in the American merchant marine which are suitable for auxiliary purposes, it is powerless to act. It is, however, distinctly the duty of the Department to prepare, insofar as it is able, means for the proper utilization of such vessels as are available.

Those with experience in the late war cannot forget the confusion, waste of time and money incident to the manning of auxiliary and reserve vessels. Prior to the war there were but few vessels in foreign trade under the American flag, consequently few officered by American citizens. Even had there been in existence at that time a Merchant Marine Naval Reserve it would have been so small as to have been almost negligible. While American tonnage was large, it was composed almost entirely of coastwise and inland water vessels. As a result of wartime ship-building, conditions at the present moment are somewhat different. The Shipping Board is operating more than 350 ships in the foreign trade and privately-owned vessels are being operated in larger numbers, but as no provision is being made for the replacement of these vessels, this favorable condition cannot be expected long to continue. The present merchant fleet does not contain many ships which will be absolutely ideal as auxiliaries in an emergency, but this fleet is performing a very important function in developing a larger number of merchant marine officers in the seafaring profession. A typically American method has been devised for giving the officers on board these vessels the training needed to make them a potent factor in the national defense, and it is the duty of Congress and the Navy to develop in every way and without delay this necessary auxiliary force.

About twenty-five years ago, a distinguished foreign naval authority expressed himself on the subject of naval reserves as follows:

> Looking at the problem from the standpoint of the statesman, it should be the aim to strengthen our Navy, as far as possible, by means which least tend to stimulate the regrettable rivalry in the maintenance of excessive armaments. Constant and large additions to the permanent force have that effect. A force in reserve does not in the same degree provoke to retaliatory measures.

Other nations have proceeded to act on this theory with apparent success. Great Britain has the splendid reserve force now known to the world as the Royal Naval Reserve (a merchant marine reserve solely) in which all classes of British society are interested. It has varied in size from time to time as exigencies occurred ranging approximately between 10,000 and 35,000 in numbers. At the present time Great Britain is spending about $2,000,000 annually for its support and requiring from the members of this reserve in return, not only an option on their services in time of war, but constant training in peace time, largely on active ships of the Navy in order to maintain efficiency. This training is usually started in early youth, generally in the grade of midshipman and lasting for a period of six months beginning immediately upon completion of their merchant school ship work and followed by additional periods from time to time as they grow in age, and advance in rank. This training includes courses in gunnery, torpedoes, signals, navigation and fleet maneuvers for deck ranks and ratings and highly technical instruction is also given to the engineer branches.

As one instance of and showing the completeness of this reserve organization, it may be stated that at the outbreak of the World War the Cunard Line was employing 163 navigating officers of whom 139, or eighty-five per cent, were officers of the Royal Naval Reserve. The direction of this great organization for the national defense of

Great Britain is based on a committee system but is under the command of an admiral with very plenary powers. The striking words of this commanding officer concerning the value to their country of this merchant reserve, during the World War, are significant of its value as a national asset in time of war. He said:

> The fact that our mercantile marine, and consequently the Royal Naval Reserve, has always included many of the world's finest seamen has never been doubted, but to many the wonderful way in which these officers and men adapted themselves to the needs of the Royal Navy in the World War came as more than a surprise.

The limitations and equalization of armaments have placed the balance of power in the merchant vessels of the contending nations. The discussions at Washington and Geneva have brought into prominence this feature of naval power.

Large and swift commercial vessels, properly armed and manned by trained personnel, are superior as war vessels to many cruisers now carried on the navy list. They can be used as commerce raiders to better advantage than can many cruisers and therefore as much care should be used in preparing these vessels for such duty as is expended on the preparation of the cruisers. Under the Merchant Marine Reserve plan this can be done with almost no cost as compared to the cost of maintaining cruisers of equal or less capacity.

The development of a merchant marine naval reserve personnel is one of the biggest and most important things, as an asset to the country, to the national defense and to the Navy that the Navy and the country at large can well advance, and is one that the American people should support.

United States Navy Hydrographic Office

By REAR ADMIRAL W. S. CROSLEY, *U. S. Navy*

Recently, Hydrographer, U. S. Navy

THE one activity of the Navy Department which, as a matter of daily routine, assists the Navy and commerce at the same time, is the Hydrographic Office. The military mission of this office is to supply ships of the Navy with charts, sailing directions and all that goes with them to make possible safe navigation of all seas of the world.

Having this major mission accomplished, a wise Congress has directed that the publications of the Hydrographic Office be sold to the mariners of the world at the cost of reproduction, which places them on the market at a very low price, much less than the cost of original production. The publications are necessary for the Navy, and, having been published on that account, they then become available for others who are interested.

To carry out better its mission the Hydrographic Office has branch offices in the principal sea ports of the United States. At these all mariners or others interested may see copies, corrected to date, of every chart or other publication. To carry out the law as regards sales there are agencies in many cities, at home and abroad, where those interested may purchase these same publications. The agents are generally those who, because of their stock, deal largely with seafaring persons.

As a part of the routine of the Hydrographic Office, it must receive information relating to the sea from all possible sources, and at this time it has approximately 6,000 correspondents supplying that information, which is tabulated, studied and analyzed in order that the deductions therefrom may be made available on pilot charts and in its various other publications.

As a concrete example of the emergencies which arise to affect this office, a recent one will suffice. When the three cruisers were ordered to the Asiatic Station better to protect American interests, they were all in American waters, but remote from Washington. It is not practicable for every ship in the Navy to carry an outfit of charts and books for all parts of the world, and they did not have those needed for Asia. They were directed to proceed via Honolulu, and within two hours after notice was received in the Hydrographic Office of their needs, their outfits were on the way to Honolulu. In addition, the Branch Hydrographic Office in San Francisco was notified and directed to keep in touch with the shipment to insure its leaving that port by the first possible steamer. Had the ships left Honolulu immediately they would have had their outfits for China, which included nearly a thousand charts and fifteen books for each ship, all corrected to the date of issue.

All of the above mentioned publications cannot be kept up to date as needed by the mariner, whether of the Navy or the merchant marine, if the Hydrographic Office does not take advantage of the improvements in instruments and methods constantly being brought out. This, again, as a rule, involves additional work, making it difficult to "deliver the goods" and at the same time remain within limited appropriations.

The largest *additional* work necessarily taken up recently by the office has been that now required for naval aviation—aviation charts—to which must be added the naval air pilot. This activity has required the detail of an aviator to the staff of the Hydrographic Office, and has made necessary working up charts not before included in the program of the office. Skilled operators must be diverted to that work instead of performing what they have been doing before in chart construction.

As ships of our Navy may not be detailed to survey in all waters of the world outside of the United States and its possessions, it is most necessary that charts be made up from the best available information that can

be obtained. At times this includes charts already issued by the other seafaring nations, but a variety of these as well as written information covering the waters in question, must be studied. In the actual construction of a new chart, therefore, parts of many may be included, and often there results a mosaic of many pieces, all of which represent the best possible information concerning the area covered by them. Only in emergencies, such as that brought about by the World War, when foreign sources of charts failed, are foreign charts really reproduced as a whole. Our experience at that time emphasized the necessity of making the United States Navy independent of foreign chart supply, and every effort is being made to insure that the office shall have plates of its own covering the entire world.

Interference with this "reproduction program" is only permitted by emergency work coming within the Navy itself, and it is really remarkable the number of times priority of work has to be altered to meet urgent requirements.

Certain confidential work performed by the office is of vital importance to the Navy, and no other agency except one wholly controlled by the Navy Department can properly perform such work. The confidential charts really constitute an important part of the war plans, and must be changed to conform thereto when necessary.

Many special charts are required for naval purposes only. In the various ports where the fleet, or many units of it, must anchor, especially prepared anchorage charts are essential. Berths must be numbered for assignment to units, and so arranged as to permit the maximum number in a limited space.

The Hydrographic Office is a manufacturing plant and a clearing house. It manufactures in the Navy Building charts and books. To be sure, the books must be printed at the Government Printing Office, but all of its activities except the actual printing and binding are performed under the roof of the Navy Building. It is a clearing house in that it receives valuable information from all parts of the world, puts it into usable shape and issues it to those most interested.

It acts in an advisory capacity in connection with the essential Ice Patrol near the Grand Banks of Newfoundland. The Coast Guard supplies the vessels for this patrol, and issues orders thereto, but the two offices work in harmony and coöperation in all respects. The Hydrographic Office issues a weekly ice chart in a graphic form during the patrol season, showing to mariners the positions of all bergs (and other ice) reported during the week. Daily broadcasts by radio give the latest information in this respect.

Probably no other human activity is subject to the many changes that affect safe navigation in narrow waters. Depths change, buoys get adrift, wrecks occur, ice drifts down from the north or up from the south, derelicts are abroad, a deck load of logs is lost overboard, and even heavy ones sink when lost while loading and manufacture a new shoal. It is essential that mariners know as much as may be possible of these conditions, and unless automatic machinery exists to notify them they cannot learn what they should when they should. This machinery also changes; radio is invented and improved.

Unless the Hydrographic Office is able to meet these new conditions it fails in its major mission; to have that ability it must expand; expansion in already overcrowded space is difficult, but there have been no complaints to date; looking ahead one can see difficulties if expansion is prevented.

The Secretary of the Navy, under the President of the United States, is responsible for the readiness of the Navy for war. Ability safely to navigate the waters of the world is a very essential part of that readiness. It will not avail to have the best gunpointers in the world if they cannot be placed where their ability to hit will win the war. The output of the Hydrographic Office is an element of readiness for war.

The Hydrographic Office is, for administrative purposes, divided into the following named divisions:

Administration,
Nautical Research,
Chart Construction,
Maritime Security, and
Distribution.

Each of these divisions is further divided into sections, each of which is charged with a particular part of the work falling to its division. Under the Division of Administration falls the charge of branch offices, finance, supplies, personnel, correspondence,

files and archives. The last named form an invaluable collection of data.

The Division of Nautical Research is responsible for the various books concerning the theory and practice of navigation, and thus it is concerned with computations of the most exact nature.

The Division of Chart Construction must be divided into many sections to cover the field. It prepares specifications for the guidance of the survey ships; it actually constructs charts, and compiles many data for that purpose; it reconstructs old charts, at times using many for the purpose of making one new one; it must have an engraving section, a drafting section, lithographic section, photographic section, transfer, lithographic printing, and plate printing sections.

The Division of Maritime Security has sections for nautical data, notice to mariners, sailing directions, pilot charts, light lists, radio aids to navigation, and aërial navigation, each of which names indicates the activity covered by it, and all accounting for the "security" involved.

The Division of Distribution is responsible for the delivery, to those entitled to the output, of all charts and publications. It is divided into the sections of books, records, issue, catalogs, chart stock and mailing lists.

Only a brief study is required to show how these divisions, and even the sections, are interwoven, and how they must function in harmony to "deliver the goods." Distribution must know when Construction will have a chart ready for issue. Construction must know when Administration needs a chart. Maritime Security must know when Administration receives a report that should receive attention by broadcast.

Mention has been made of the many correspondents of the office from whom information is received. These, of course, include ships of the Navy, which, when on other missions, are able at times to make surveys of more or less completeness, depending upon the major mission.

In addition, three vessels of the Navy are detailed for survey duty only, and besides furnishing complete data for the construction of accurate charts, are schools of great value to the naval personnel attached to them. In these days of steam and electricity, major fleet maneuvers and force target practice, not much time remains for teaching that which is of the greatest value in emergencies, namely, certain more strenuous forms of seamanship as taught in former times. The officers and men attached to the surveying vessels are the only ones who, by the very nature of their service, now are obliged to get that form of training.

The U.S.S. *Hannibal* has been surveying on the south coast of Cuba and the U.S.S. *Nokomis* on the north coast, while the U.S.S. *Niagara* has been surveying in the Gulf of Venezuela. Already valuable charts have resulted from their surveys and more are "in the making."

The *Niagara*, during the next season, beginning in June, will complete the survey on the north of the Guajira Peninsula and will then, according to present plans, take up very necessary surveying in the Gulf of Panama.

In connection with the sale of publications issued by the Hydrographic Office, an interesting handicap results. Money is appropriated by the Congress for the work of the office; charts and books are prepared by the expenditure of this money. As previously indicated, these must be sold at the cost of their reproduction, *but*, moneys so received must be turned in to the Treasury to the credit of "Miscellaneous Receipts," and the condition arises that sales constitute a financial hardship to the office! That is to say, appropriations are expended in producing publications; these publications represent a certain amount of work performed by the personnel; were it not necessary to sell some of the publications, and consequently not produce so many, the personnel could be employed on other work! The drain on the appropriations is about $30,000 per year, a rather large proportion of the whole! (This amount representing the usual annual sales).

The United States has a membership in the International Hydrographic Bureau, there being twenty-three States Members. That bureau acts as a "clearing house" for the Hydrographic Offices of the States Members, and makes available to them data they might not otherwise obtain. Its seat is at Monaco and regular international conferences are held there every five years, though intermediate conferences may be held when so agreed by the members. Members and non-members who are invited to do so may send delegates to Conferences.

The bureau is governed by a directing committee of three, elected at conferences. At the Conference held in October and November, of 1926, Rear Admiral A. P. Niblack, U. S. Navy (Retired), was elected president of the directing committee; the other two members are French and Italian. No two directors may be of the same nationality.

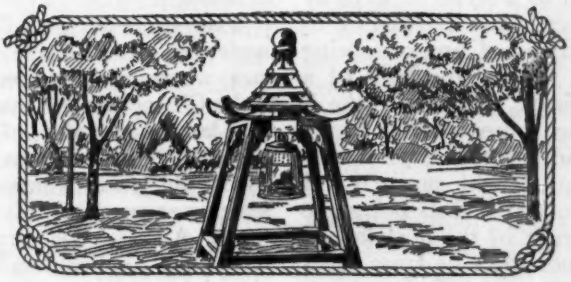
The International Hydrographic Bureau collects, compiles and publishes data which it issues to the world in the form of a regular magazine, *The Hydrographic Review*, and also issues special publications when circumstances warrant.

An interesting and valuable machine has been invented by personnel of the Hydrographic Office, which has been described in other places; it is a modification of the pantograph, and is called the pantograver. With it copper chart plates may be engraved directly from a photographic glass plate. As the smooth sheets of surveys can always be photographed in any desired size, and the pantograver can reduce the scale of the photograph to that desired for the chart, it immediately cuts out the intermediate drafting otherwise necessary. While it is not possible to entirely abolish hand engraving, the pantograver does so much additional work that production is much greater.

It is advantageous to have copper plates for charts for the reason that they are a permanent record from which an engraved chart may be "pulled" at any time and reproduced by photolithography. The plates can readily be corrected by the hand engravers as necessity arises.

As the output of the Hydrographic Office is, generally speaking, manufactured articles, it follows that the amount of the output is entirely dependent upon the size of its appropriations. It is also a fact that the greatest variety and amount of work performed falls upon it during peace, for during war surveying must cease and all hands produce and distribute. We all know that unlimited amounts are available when war actually arrives, but it is not easy to convince those not particularly interested that additional funds are needed during peace. The mission of the Hydrographic Office cannot be accomplished unless it constantly improves its output; it cannot do that unless its money available increases to meet the requirements.

As an indication of the variety of work performed, somewhat indicated by the names of the divisions and sections, the personnel of the office represents sixty different ratings, each numbering from one to ten, 154 civilians being employed at the time the count was made.



Sea Power *and* American Destiny

By CAPTAIN R. D. GATEWOOD *(Construction Corps), U. S. Navy*
On Duty with U. S. Shipping Board

WHILE in London last winter on a special mission for the United States Shipping Board I saw on the wall of one of the offices of the British Board of Trade an old English shipping text. I liked it so much that I brought a copy back to America and now have it framed in my own office. It is this:

> As concerning ships, it is that which everyone knoweth and can say, they are our weapons, they are our ornaments, they are our strength, they are our pleasures, they are our defense, they are our profit; the subject by them is made rich, the Kingdom through them, strong; the Prince in them is mighty; in a word, by them, in a manner, we live, the Kingdom is, the King reigneth.

We knew all this at various and sundry times, knew it well, and practiced it. It is the Law of Gravity of Shipping. For all practical purposes it may be called the great Natural Law of Sea Power. Now, a natural law requires unceasing obedience. It is not something to be obeyed every other generation or every seventh year or only when we have a Republican administration. All this we know, too, and yet—

History should be taught, not as a mass of dates, or a succession of wars, or a compilation of kings, but as a series of steps by which man has risen from barbarism to civilization, this stairway of progress being illumined along the way by the light of a relatively few significant facts that make it possible to trace the causes of the movements and forces back of our development. But even when thus taught properly, of what use is our history if it does not guide us and help us to profit by the mistakes of the past, if it does not force us from sheer fear, if nothing else, never to disobey a natural law!

It is hardly necessary or desirable to carry our argument back to the dawn of history and prove, as we could by a lengthy series of examples, the unfailing operation of our Law of Gravity of Shipping. It would require a book to do this and, indeed, that book has already been written, a very remarkable book, an epoch-making book, *The Influence of Sea Power upon History*, by Rear Admiral A. T. Mahan, U. S. Navy.

We will consider only a few incidents in our own American history which show how well and how often we have known this law, known it and forgotten it, practiced it and then ceased, known it and forgotten it again and again, and finally known it as the greatest single lesson of the greatest of wars and yet today are forgetting it again. A nation so forgetful cannot always expect its national luck to hold.

We knew it when we learned as little children how America was discovered by ships furnished by Spain, then the world's greatest sea power, and we knew it when we learned how America was lost to Spain by the rise of a greater sea power, England. We knew it again when, a century later, English sea power defeated Holland and annexed the Dutch colonies here. Another century passed and we knew it again when English sea power defeated France and annexed all of North America east of the Mississippi.

Then came our own Revolution, and what were the two decisive actions? The first was when Arnold won the first battle of Lake Champlain and thus paved the way for the later surrender of Burgoyne's whole army. The second was the battle of Yorktown, which was won as the direct result of sea power supplied this time by the French under Admiral De Grasse. He had outwitted the English fleet and appeared at just the right moment off the Virginia Capes, cutting the sea communications of Cornwallis, which were all he had, and causing his surrender. George Washington's generous acknowledgment of this fact is found in his letters to De Grasse at the time. He says:

> The surrender of York (town) from which so much glory and advantage are derived to the allies, and the honor of which belongs to your Excellency, has greatly anticipated our most sanguine expectations.
>
> Your Excellency will have observed that, whatever efforts are made by the land armies, the Navy must have the casting vote in the present contest.

Very early after we became a nation, we again saw our law in operation. In 1799 France began seizing our merchantmen in the West Indies and our Navy had to convoy our merchant ships. While doing so it captured enough French cruisers to make plain that we were able to uphold our neutrality and dignity, and ultimately we virtually forced Napoleon to make a new treaty of peace with us.

We knew it again several years later when our sea power forced terms from the Barbary pirates of the North African Coast after they had harassed our merchantmen beyond endurance. Our success there was the beginning of the downfall of this whole nest of pirates that had for centuries been preying upon the commerce of all nations.

We knew it again in 1812 when England began to seize hundreds of American citizens from our merchant ships and even our naval vessels. We went to war about it even though totally unprepared on the sea. We were promptly blockaded so tightly that none of our vessels could appear on the Atlantic Ocean and so we turned our seagoing activities inland to our Great Lakes. Here Perry won his victory on Lake Erie, forcing the retirement of the British right wing and a year later Macdonough won the second battle of Lake Champlain which forced the retreat of General Provost with a large part of the British Army into Canada and ultimately decided the war in our favor. How decisive sea power was in this war may be seen from the reply of Wellington, Napoleon's conqueror, when he was asked in the emergency to take command over here. He replied:

> Neither I nor anyone else can achieve success, in the way of conquests, unless you have naval superiority on the Lakes. . . . . The question is, whether we can obtain this naval superiority on the Lakes. If we cannot, I shall do you little good in America, and I shall go there only to prove the truth of Provost's defense, and to sign a peace that might as well be signed now.*

*Wellington to Liverpool, November 18, 1814. *Castlereagh Letters*, Series III, Volume II, 203.

And peace was signed several months later.

For a long time after this we knew it and practiced it and we prospered mightily. It is said that we are not "ship-minded," but do you know that between the years of 1795 and 1810 we carried ninety per cent of the world's off-shore commerce in American-flag ships? Do you know that for fifty years afterwards we sailed the smartest, fastest ships in the world? We were the first to carry full sail through the night; all the others shortened sail. Our clipper ships with their lovely lines and huge areas of sails commanded the high priced cargoes of the world and left our rivals idle or trailing far behind with low priced freights.

The Civil War came and gave us another splendid example of the operation of our law. The gold rush of 1849 had brought urgent need for ships and more ships and had taught us to build still larger and faster vessels. With this knowledge and skill the North soon had over 250 ships blockading the seaports of the South. A little later more ships extended the blockade up the Mississippi River, splitting the South in two. Eventually, except for a few blockade runners, the South was cut off from all manufactured articles until Lee's armies were without clothes, shoes or ammunition and even without proper food. All authorities agree that the blockade of the South by the sea power of the North was the most decisive single factor in the war.

Until the Civil War we were a real sea power. Then we began to forget it. There is no one reason for it. The explanation is a combination of many reasons.

Much of our tonnage was destroyed in the war and foreigners, especially England, reaped a harvest in the trade that gravitated to them. Just at this time came the evolution from wood to steel, and a whole new era came into being. England's coal and iron ore were at or near the seacoast, and she was lightning quick to seize her advantage and learn the new art of steel shipbuilding. She was quick, too, to grant large subsidies to this infant industry. We were slow to appreciate the value of steel construction, far too slow, principally because of the ease of making fortunes through the development of great natural resources in the interior of our country. Our gaze and our energies were all turned in-

ward toward the "winning of the West," toward internal empire building, toward the greatest railroad building and industrial development the world has ever seen. We slowly left the sea for the temptations of the land until by 1910 we were carrying only eight per cent of the world's commerce.

In 1898, when the Spanish War came, we had no merchant ships to carry supplies or troops to even the pitiful little army that we had sent to Cuba—and do you know how we got our men back from Cuba and the Philippines? How do you suppose? In merchant vessels of the Spanish merchant marine that we had to charter! Would you believe it possible? and yet, it is history.

It is true that, due to Secretary Whitney and several others who followed him, we had a Navy when the Spanish War came, but just how did we get it? I know because my father helped to build it. He was one of the first two naval constructors of our Navy. There was no school or college in this country where he could learn the art of naval architecture and marine engineering and he had to be sent abroad in 1880 to England and Scotland. Every year for twenty-two years after that we had to send all our naval constructors abroad for the technical training and education. Our first battleship, *Texas*, was built to plans purchased from an Englishman.

I was a member of almost the first class to graduate from an American institution in naval architecture and that was in 1906, —forty years after the close of the Civil War, forty years after a great maritime nation had plunged headlong away from the sea. In that same year when I went to duty at a navy yard, the master shipfitter, the master shipwright and dockmaster, the foreman joiner, the foreman machinist, and the chief draftsman were all Englishmen or Scotchmen.

Do you know that in 1900 no American-flag ship sailed from our shores to the following countries: Russia, Sweden, Norway, Denmark, Netherlands, Italy, Hungary, Greece or Turkey. In that same year only two small sailing vessels left our shores for France and both of them returned in ballast. One small vessel left for Belgium and returned in ballast.

When President Roosevelt sent the fleet around the world in 1908 we had to use foreign-flag merchant vessels to carry the coal and supplies for those few naval vessels. We had only eight auxiliary vessels and had to charter fifty and we had to pay very dearly for them. Applying our Law of Gravity of Shipping, we learned then that in time of war we could not count on using the other fellow's vessels. We learned that a modern navy is not just a fleet of warships and that it must have a merchant marine to support it. To operate on the offensive or even on the defensive at any distance from home, warships must be accompanied by a great number of auxiliary vessels, such as scouts, ammunition ships, tankers, supply ships, refrigerator ships, hospital ships, mine layers, mine sweepers, submarine tenders, destroyer tenders, etc.

This type of craft must be drawn from a merchant marine, because it would be an unthinkable waste to build these auxiliary ships and keep them idle, and besides, you would never build enough of them. If you have no merchant marine, if you have not built enough auxiliary ships, if you cannot charter them, as of course you cannot when the enemy holds the sea, then a navy alone, however powerful, is fit only for coast defense. A navy without a merchant marine is no navy.

It was about this time that we in this country learned to know the real meaning of the term sea power. It was not just a navy plus a merchant marine but it included great harbors with dockyards and repair facilities, skilled mechanics to build ships, a sea-minded population to design and man them, a highly commercial nation to provide the trade in which the vessels could be used, colonies to provide naval bases and ports to act as fueling and repair stations for the fleet. All these elements go to make up that very comprehensive term sea power. A navy is merely one of its constituents.

But now to return to our law. All this Roosevelt knew well. He tried to drive it home to the American mind by exposing our weaknesses and advertising our helplessness. He was not exposing any deep military secret. Every foreign government, every naval expert already knew it. But Americans would not heed. Every morning of that memorable cruise around the world every American could read on the front page of his newspaper that a merchant marine is vital to a navy and that naval bases with protected drydock and repair facilities are vital

to both. They could read it, they did read it, but they would not learn, mark, or inwardly digest it.

We would not heed the words of Roosevelt, we continued to rely on our national luck, we would not see with any understanding the working of our Law of Gravity of Shipping. We were satisfied merely to improve our Navy, even though we realized how helpless it was without a merchant marine of auxiliary ships.

Then came the lesson of the World War, a $3,500,000,000 lesson this time. The rest you all know. How our export trade was paralyzed for lack of ships; how great lines of full freight cars blocked all the tracks from Jersey City to Philadelphia; how nearly all our ports had to declare embargoes on incoming materials for ocean shipment; how the South was crucified for years on the cross of "No more ships" with its cotton and other products piled high on every pier and most of its business men and farmers in the hands of the banks.

The Germans saw clearly and felt deeply the menace of the Allied sea power. They had accomplished prodigious feats of arms on shore but it was not enough. They felt the same slow strangulation of death setting in that the South had felt in our Civil War due to the sea power of the North. They were driven to take the most desperate chances and finally went too far by sinking our neutral vessels without warning and forcing us into the war against them.

Again you will remember what happened. We built ships as ships had never been built before, hundreds of ships, thousands of ships, steel ships, wood ships, concrete ships, cargo ships, tankers, transports, tugs. We built great shipyards, whole towns to house their workers, and trolley lines to take them to work. We built drydocks and marine railways and great piers and terminals and warehouses. We requisitioned all ships building in our country for any and all interests and ordered ships built in Japan and China.

We performed a miracle in ships, and yet, it was not enough, it was not in time. You know that, you remember it well. You know how few, how very few of our men we sent over on our own vessels. You know, too, that we were on the side that held the sea, or at least the surface of it. How would it have been had German sea power been in control? How truly lucky we were.

I have said it was not enough—but in a larger sense it was enough and too much. As soon as Germany realized that her submarine warfare could not obtain command of the sea for her as it promised to do for a time, as soon as she realized that the element of sea power would always be against her, that her enemies could obtain unlimited supplies while she herself must continue to undergo the frightful hardships of the blockade, she knew the war was lost. Again sea power had "the casting vote."

We came out of the World War nine short years ago, with all the elements of sea power—a Navy, an "emergency" merchant marine, shipyards and artisans to build and maintain them, colonies, naval bases, a highly productive population backed by great natural resources, and an immense world trade of nearly $10,000,000,000. Today we are the greatest and richest of all commercial nations. We must have a navy to protect our coasts, our commerce, and our colonies. We must have a merchant marine to provide (1) vessels that every modern navy is helpless without, and to provide (2) a seafaring personnel on which the navy may draw in emergency, and to provide (3) a means of bringing in our needs and carrying away our products. Our sea power is our most precious national possession, but what are we doing about it here and now in the year 1927?

Our Navy is not being maintained at treaty strength in accordance with the 5-5-3 ratio. This is admitted officially and I say it without fear of contradiction. Our merchant marine is not being maintained in a condition to compete for the share of the world trade that is rightfully ours, because no new vessels are being laid down to take the place of slow vessels now nine years old and that were never designed for the trades in which many of them are operating. Sea trade is open to the nations of the world and no business is more competitive. To be successful you must have ships that are at least equal to those of your competitor. England, Germany and Italy are building like mad, fast ships, motorships, passenger ships. We are building nothing.

Do you know that we are not building a single hull for foreign trade? The very few vessels that are building are for our coastwise trade.

The condition of our shipyards is pitiable. Most of them have gone out of business and

the very few that are left have only skeleton forces of draftsmen and mechanics and have made no renewals of shop tools and equipment for over five years. It is only a matter of months before more yards will close their doors, and when we do decide to build ships (as we inevitably must), how long will it take, how much will it cost, and indeed where will we find the yards to build them at all?

The position is far more critical than those in high authority appreciate. The ships of the future will be larger and faster vessels than those of our wartime-built fleet and will require far more skill to design and build. It requires years to collect an organization of men trained to do this work and during the past eight years the shipbuilding industry has lost more than half of its trained men and is losing more every day. Our building yards must have some work and have it soon or this great element of sea power will fail us when we need it most.

But this is not a thesis in favor of our shipyards, or a merchant marine, or a navy. It is a short article supported by history and fact intended to convince intelligent Americans of the great meaning of ships. I have shown, as briefly as I could, that since America was discovered, sea power has played the decisive part in our destiny. You have seen how, except for the Mexican War, it has been the governing factor in every war we have ever had—seven of them. You have seen, too, that we have never used it except in self defense or in the cause of human liberty, and there is no likelihood that we ever will.

In the future as in the past, sea power must inevitably play the leading rôle. Our destiny lies on the sea. When we leave it we are through. Every American ought to know this. Every boy and girl ought to be taught it in our schools. The decline of our sea power marks our decline as a nation.

As concerning ships, it is that which everyone knoweth and can say, they are our weapons, they are our ornaments, they are our strength, they are our pleasures, they are our defense, they are our profit; the subject by them is made rich; the Kingdom through them, strong; the Prince in them is mighty; in a word, by them, in a manner, we live, the Kingdom is, the King reigneth.

This is the first great law, and the second is like unto it:

Take it all in all, a ship of the sea is the most honorable thing that man as a gregarious animal has ever produced. By himself, unaided, he can do better things than ships of the sea; he can do poems and pictures and other combinations of what is best in him. But as a living being in flocks and hammering out with alternate strokes and mutual agreement what is necessary for him in those places, to get or produce a ship of the sea is his first work. Into that he has put as much human patience, common sense, forethought, experimental philosophy, self-control, habits of order and obedience, thoroughly wrought handiwork, defiance of brute elements, careless courage, careful patriotism, and calm expectation of the judgment of God as can well be put into a space 400 feet long and fifty feet broad and I am thankful to have lived in an age when I can see this thing done.

Courtesy of the Southern Pacific Steamship Lines

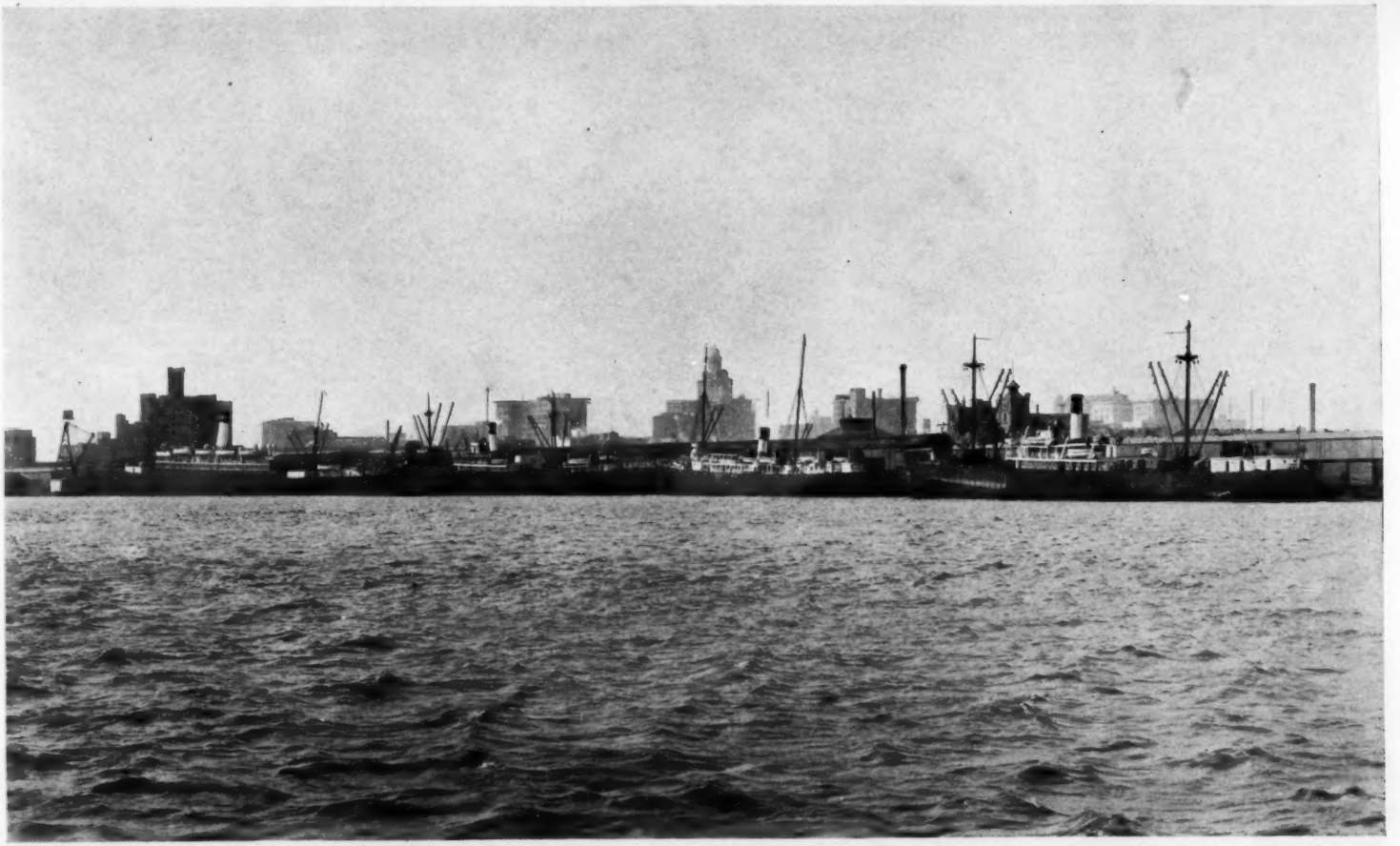
VIEW OF GALVESTON TERMINAL FROM PELICAN DIKE
Showing company's ships, tugs, derricks and terminal equipment.

Courtesy of the Southern Pacific Steamship Lines

VIEW OF NEW YORK TERMINAL, STREET END

Courtesy of the Southern Pacific Steamship Lines

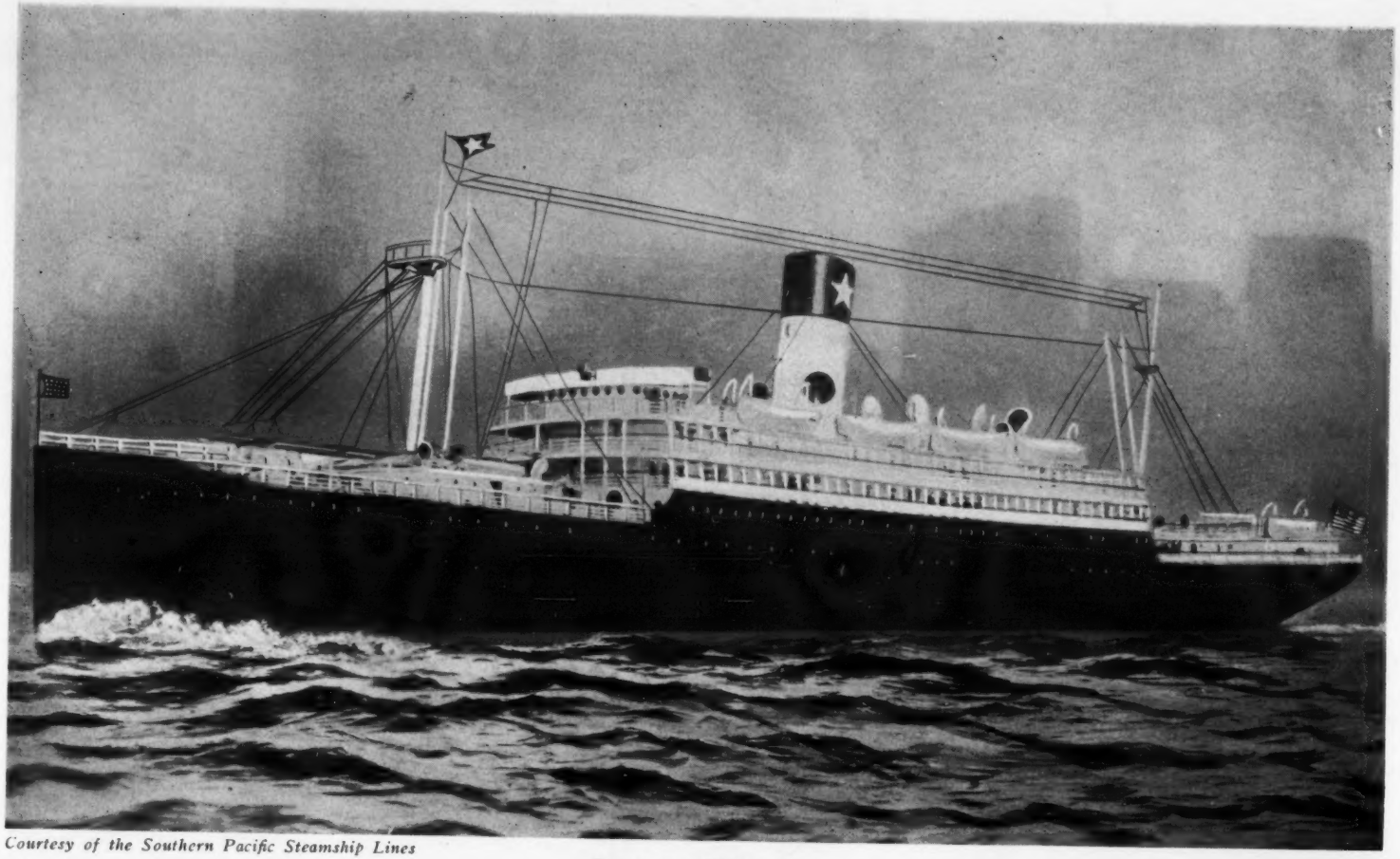
VIEW OF NEW YORK TERMINAL, STREET END



Courtesy of the Southern Pacific Steamship Lines

RIVER VIEW OF NEW ORLEANS TERMINAL

Ships left to right: *Momus, El Islès, Chalmette,* and *El Capitan.*

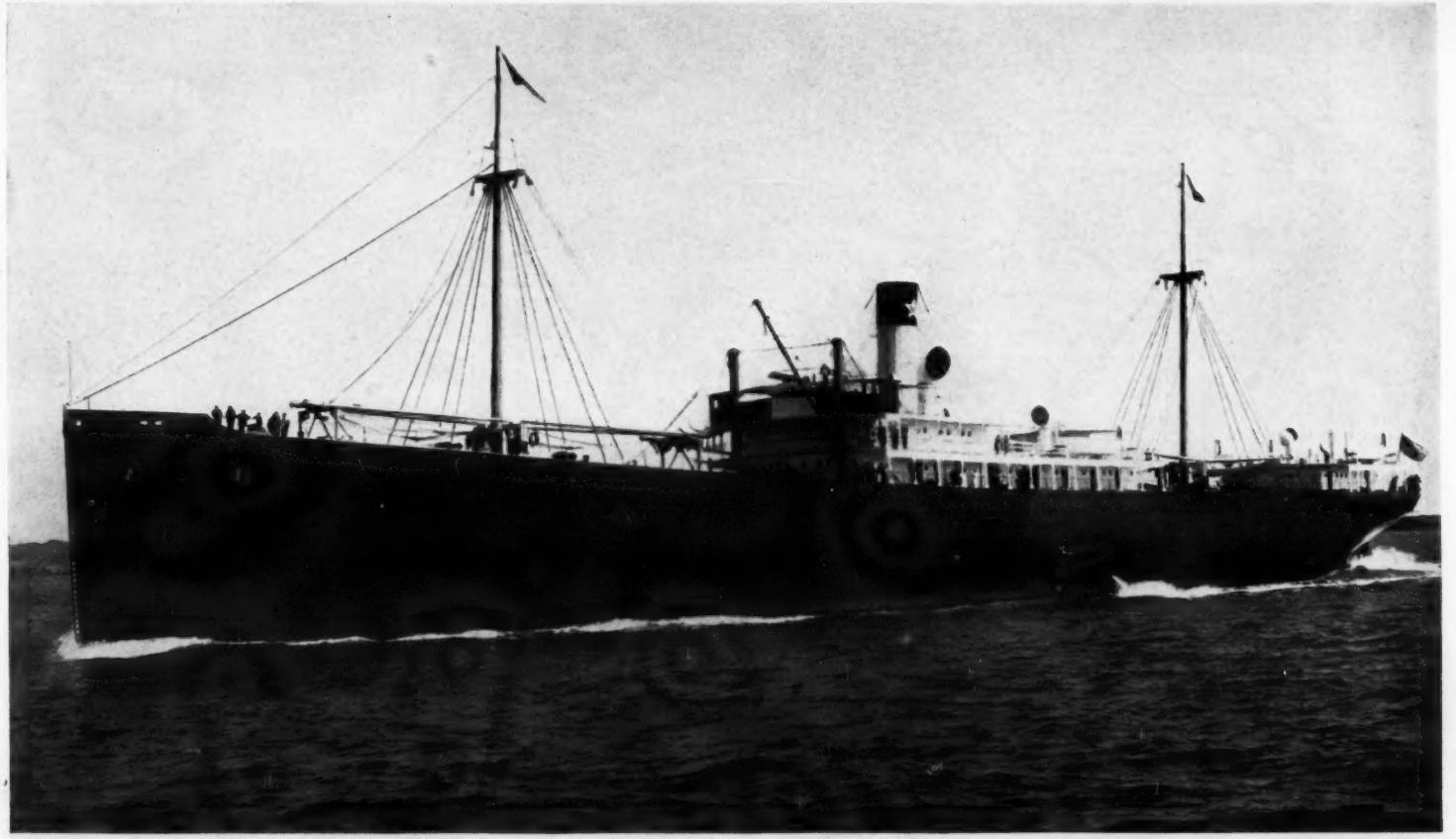


Courtesy of the Southern Pacific Steamship Lines

STEAMSHIP "MOMUS"
Sister ship of the *Creole*.

Courtesy of the Southern Pacific Steamship Lines

STEAMSHIP "MOMUS"
Sister ship of the *Creole*.



Courtesy of the Southern Pacific Steamship Lines

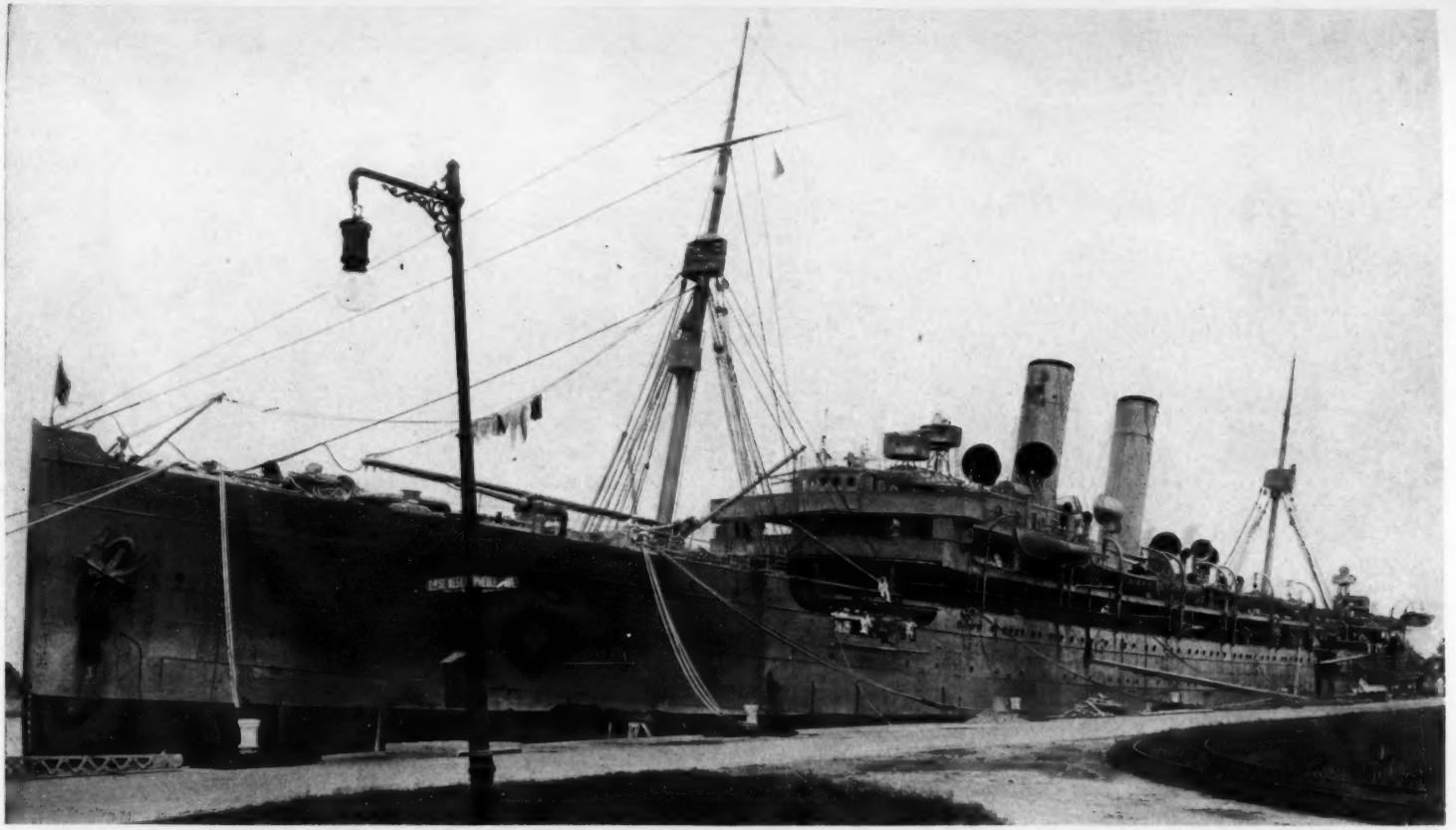
S.S. "EL OCEANO"
Taken on trial run. Single screw, turbine driven, oil burning.

Courtesy of the Bureau of Supplies and Accounts, Navy Department, Washington

NAVAL SUPPLY STATION, NAVAL OPERATING BASE, HAMPTON ROADS, VIRGINIA

Courtesy of the Bureau of Supplies and Accounts, Navy Department, Washington

NAVAL SUPPLY STATION, NAVAL OPERATING BASE, HAMPTON ROADS, VIRGINIA



Courtesy of Navy Yard, Philadelphia, Pennsylvania

S.S. "DE KALB"

The converted German raider, renamed the *De Kalb*, taken over by the United States upon our entrance into the World War. She was formerly the German merchant vessel *Prinz Eitel Friedrich*, and after conversion in China made a raiding cruise of seven months against the Allied commerce, but was interned at Newport News. She was reconverted by us at Philadelphia and used as a transport to carry troops to Europe.

Official photograph, U. S. Navy

PLANES OF AIRCRAFT SQUADRONS, SCOUTING FLEET, LINED UP FOR INSPECTION, NAVAL AIR STATION, HAMPTON ROADS, VIRGINIA

Naval Aviation

By REAR ADMIRAL WILLIAM A. MOFFETT, *U. S. Navy*
Chief of the Bureau of Aëronautics

VIEWED from every angle, the advance in naval aviation during the period following the World War has been satisfactory. Starting out with patrol planes as the only well developed type, and with the wartime personnel demobilized, we have progressed to the point where we now have very highly satisfactory airplanes in all classes in quantity production and our officer and enlisted personnel on a stable basis. Naval aviation has advanced from a limited activity covering anti-submarine defense to one of widespread application as an integral part of a homogeneous fleet. This development has involved a tremendous amount of effort in which practically every branch of the Navy has an important part. Our progress should be a source of pride to the whole Navy and a source of satisfaction to the country at large.

Wartime naval aviation personnel was drawn very largely from civil life. With the demobilization of these officers and men, naval aviation was reduced to a mere skeleton. The problem of building up the personnel from officers and enlisted men of the regular establishment has been a difficult one. Thanks to the active training of enlisted ratings at the trade schools, our present enlisted strength is highly efficient. Thanks to the splendid work done by the Naval Air Station, Pensacola, in the training of officers and enlisted pilots, our flying officers and men are without superiors. We are still confronted with the problem of expanding the officer and enlisted personnel strength to meet the needs of our five-year development program. This program, passed by Congress in June, 1926, calls for 1,000 planes of the latest types at the end of five years.

From the viewpoint of material, the development of improved types of aircraft to meet the needs of the fleet has been a complex one. Naval aircraft must meet certain restrictions not imposed upon shore-based aircraft, and must meet these restrictions without inferior performance. Naval aircraft must be as small as it is possible to make them and still perform the mission satisfactorily. They must be able to land slowly as seaplanes or landplanes in order to be useful in rough water, or on the decks of carriers. They must be readily convertible from landplanes to seaplanes, capable of being catapulted from the decks of ships, or of landing into the arresting gear on a carrier. They must be reinforced to withstand the stresses of catapulting and deck arresting equipment. Their performance as seaplanes must not be inferior to the best shore-based landplane performance. Manifestly, this is a large order.

In attacking the problem, the Bureau of Aeronautics has realized that the fundamental starting point in any design is the power plant. Something had to be done to reduce the weight and complication of the wartime aircraft engines. A careful analysis indicated that by using the air-cooled type in place of the water-cooled type, a reduction in weight could be had through the elimination of the cooling system. Further reductions could be had in power plant weight through the use of the radial form of engine. Furthermore, through the elimination of the cooling system, we could get rid of one of the greatest sources of aircraft troubles. The Bureau of Aëronautics, therefore, established as its policy the development of air-cooled aircraft engines and of making types of aircraft capable of utilizing the inherent advantages of the air-cooled engine.

Any engine development program involved a rational procurement program for aircraft. The airplane and engine programs were therefore prosecuted side by side. In order to meet our needs for fighting airplanes, observation airplanes, scouting, tor-

Official photograph, U. S. Navy
PLANES OF AIRCRAFT SQUADRONS, SCOUTING FLEET, LINED UP FOR INSPECTION, NAVAL AIR STATION, HAMPTON ROADS, VIRGINIA

pedo, and bombing airplanes, training planes, and patrol planes, it appeared that we needed three sizes of engines; 200 h.p., 400 h.p. and 500 h.p. The development of the Wright "Whirlwind" 200 h.p. engine which has given such a splendid account of itself in the flights by Byrd, Lindbergh, Chamberlin and Levine, Maitland and Hegenberger, and finally again by Byrd, was fostered by the Navy Department. This engine has demonstrated itself to the public only this summer but it has been in general use in the fleet for a number of years. Hundreds of them have been flown by naval pilots in all corners of the globe.

In the 400 h.p. class of engine we have fostered the development of the Pratt and Whitney "Wasp" which has recently recovered five world's seaplane records and has demonstrated its entire suitability to employment in fighting and observation airplanes. More recently still, the Pratt and Whitney "Hornet" 500 h.p. engine and the Wright "Cyclone" 500 h.p. engine have advanced into the production stage as a result of some striking developments in airplanes.

In general, the material situation is this: We have in production convertible landplane and seaplane fighters capable of being catapulted from the decks of ships or of use from the decks of carriers. Strangely enough these airplanes as seaplanes are superior to many of the best landplane fighters now known. In the two-seat observation class, we have a convertible landplane-seaplane shipboard-carrier airplane which, with the two-seat observation load, is superior to some landplane single seaters. A service airplane of this type without modification recently returned to the United States one world's seaplane altitude record and three seaplane records for speed. In the three-seat observation class, we have the Loening amphibian, and a very promising development which is now being undertaken. In our three-purpose, scout-torpedo-bombing machine, we have in our *T4M* a convertible landplane-seaplane of very striking characteristics. It carries a very large useful load on a very small gross weight and has remarkable performance and flying qualities. In the patrol class we have our large flying boats fully developed and available for quantity production in case of necessity. The training plane problem has been solved with satisfaction and large numbers of new planes are now in general use. Insofar as material is concerned, the Navy stands today with proved types ready for quantity production in all classes so that in case of emergency we could go into immediate production in enormous quantities and could supply aircraft even more rapidly than we could supply personnel to man them.

The personnel problem is on its way to solution. It is necessarily a complex one. Out of a large number of officers and men in the Navy, a comparatively small percentage show the degree of physical and psychological fitness deemed necessary at present for military or naval pilots. It is true that the average individual can learn to fly an airplane, but to do the sort of flying required of military and naval pilots requires at least somewhat unusual qualifications. Furthermore, a long period of training is necessary to fully qualify naval aviators. Thanks to the fine work being done by the Naval Air Station, Pensacola, this problem is gradually being solved. It has been particularly gratifying to see the number of senior naval officers who have been able to meet all of the exacting requirements of the Pensacola flight training course. These senior officers will bring to aëronautics the rank and experience necessary to bring about its full development.

In the matter of safety in flying, the improvement has been both steady and marked whether we measure it by fatalities per mile flown, per hours flown, or per flight. Flying in the Navy is approximately one-fifth as hazardous today as it was five years ago. A number of factors are working steadily toward improvement. Our latest aircraft are built of metal and in case of a crash serious injury to the pilot is much less likely to result. Modern aircraft are under much better control at stalling speeds and therefore much less likely to spin from a stall. In case they do spin, recovery is much quicker and a crash more easily averted. Modern airplanes have a much greater surplus power. Under the new system of training, the quality of our flying has improved. In general, flying can be said to be very much less hazardous now than in the past and numerous forces are working to very great improvement in the future.

New construction in each phase of the Navy's lighter-than-air program is progressing satisfactorily. One new non-rigid train-

ing airship is ready for erection and an all metal experimental airship is under construction. Work on one of the two 6,000,000 cubic feet airships authorized in the five-year building program will be started in the near future. This ship will be the first to be built primarily as an aircraft carrier.

In the matter of operations, we have progressed a long way. From an activity of limited application in the World War, aëronautics has become not only an integral and component part of the fleet but one of the most essential factors in fleet operations. This has been accomplished with aircraft still in the development stage and of limited capacity. When the new airplanes now on order get into active service within the year, aëronautics will be of even greater import to the fleet and of greater usefulness to the commander-in-chief. The delays in the finishing and fitting out of the carriers have retarded our fleet program and indications are that this problem will be solved in a short time. With the arrival of the new carriers in the fleet, we will have a powerful striking force equipped with the most modern aircraft in the hands of skilled personnel. At the same time, the aëronautic units on the battleships and light cruisers will have new efficient equipment and will be highly trained. When one considers the complication of the problem, he must realize that the art has advanced tremendously.

This advance of the art is largely due to the fact that the Navy has had control of its aviation, it has had the initiative in the development of material and personnel to meet its peculiar needs. Continued control of its own aëronautic activities is absolutely vital to the fleet. Recent trans-oceanic flights have shown all the more the absolute necessity of a mobile air force based on the vessels of the fleet. If any change in the organization with respect to aëronautics were to be brought about, the Navy would suffer a blow from which it would probably never recover. The fleet and aviation are one and inseparable. The record of progress to date is indication enough of the entire suitability of the present method of organization and administration. It is absolutely vital that nothing be done to disturb the present steady development. In fact, the Navy should push on as a unit in the development of all its arms on the firm basis of maximum usefulness to the nation in time of emergency.

The Training *of the* Fleet

By Rear Admiral H. J. Ziegemeier, *U. S. Navy.*
Director of Fleet Training

Note: This article was prepared at the request of the Navy Day Committee for the Special Information Number with a view of interesting Naval Reserve Officers and civilians when the Navy holds open house on Navy Day. The active service is familiar with these activities, as they form part of our daily occupations.

IN CONSIDERING the training of our fleet, distinction must be made between the training of individuals at the training stations, special schools, correspondence and post graduate courses, and that of the fleet as a whole. The following refers solely to the training of the fleet. This training of the fleet is directly under the Chief of Naval Operations who, by the law creating that office, is "charged with the operations of the fleet, and with the preparation and readiness of plans for use in war." (Act March 3, 1915.) The Division of Fleet Training in Operations is directly concerned with these activities and preparations. A rear admiral or senior captain who has had experience in the fleet is the director of this division.

The standardizing of tactical instruction and training is centered in the Division of Fleet Training. This division assists in coördinating, planning, and in directing the operations and training of the fleet. General instructions are issued to the service prescribing the rules for exercising the various units of the fleet. This division coöperates with the fleet and Naval War College in study and research in all branches of fleet training and all exercises are reviewed by this office and compiled in form suitable for information and guidance of the service.

A fleet consists of various types of ships, such as battleships, battle cruisers (our fleet does not include this type), light cruisers, aircraft carriers, destroyers, mine layers, submarines, and aircraft. The development of these different types has been gradual and was designed to meet the progress of science in construction, ordnance, and engineering. All these types have their special uses and would be employed in a fleet engagement. For each type there is a certain tactical employment when it is most effective. While their characteristics and employment are studied at the War College and on the game board, it is in the fleet and on the high seas that the best answer is found. Ships are exercised singly in certain forms of tactics and shooting; after that, several of a class are combined to form divisions, they in turn to form squadrons, and lastly, the fleet. Thus the training of the fleet progresses from the training of the individual ship to the smaller units of similar type; then to the major units of the fleet composed of groups of different types; and lastly, the groups of major units forming the United States Fleet. Now each of these subdivisions must be exercised tactically to obtain efficiency, and the same applies to the whole fleet. Where so many different units are in formation, and where each has its distinctive function, it is essential that the commander-in-chief have efficient and indoctrinated units to coöperate them all. All this requires continual drill and training. Our ships are constantly trying out new problems and situations. This is true of the various units and to a lesser degree of the whole fleet. The various units have been assembled once a year for fleet concentration. In 1925 the fleet had a joint problem with the Army at Hawaii; in the spring of 1926 a minor problem with the Army at Panama; and in 1927 one at Panama and one at Narragansett Bay. Such problems afford senior officers an opportunity of handling large units, meet tactical and strategic situations as they develop.

The chief factors entering into the efficiency of the Navy's ships are gunnery, engineering economy, and communications.

The fleet's readiness for an emergency depends upon the individual units composing such fleet. A ship must be able to hit the target, and the best trained ship is the one that can hit the target the greatest number of times in the shortest space of time; in other words, it is hits per gun per minute that count. In any engagement the ship that registers the most hits in the shortest time and gets them in first, establishes a big handicap, and will probably win the battle. Supposing the enemy to be equally efficient as you are, if your hits register before his do, the advantage is yours. The best way to get this is to fire at longer range, and so every effort is made to successfully fire at long ranges. There are, of course, mechanical limits at which guns can be fired. It is here where ships having larger range, due to such factors as size and length of gun, angle of elevation, etc., have their superiority.

All of our ships' firing is upon a competitive basis, and this is so for the various types of ships and caliber of guns. In order that the competitive feature may be fair, the various practices are fired under as nearly similar conditions as possible. Competition is used as a spur to get the most efficient training and it has proved itself an excellent system. Naval target practice covers a wide field. It takes cognizance not only of the firing of individual ships, but also of groups of ships as organized into divisions, squadrons, or fleets. It has to deal with various weather conditions, such as visibility, condition of the atmosphere, speed of the firing ship, as well as course and speed of the target. It must take into consideration many calibers and types, such as the 16-inch guns of our dreadnaughts, the smaller calibers of our cruisers, the torpedoes, guns and depth charges and mines of destroyers, torpedoes from submarines, and bombs and torpedoes from aircraft.

The Division of Fleet Training determines the most important gunnery problems for different classes of vessels. Definite printed rules and instructions are issued to insure that the objects of the practice are secured. As most of the firings are on a competitive basis, it is desirable that they fire under similar conditions. To use the various calibers of guns at their maximum power, advantage must be taken of the tactical employment best suited to each particular type of vessel. Each form of practice represents some tactical problem, involving range finding, determining speed and course of the enemy (target), spotting the fall of shot (getting them on the target). As would probably be the case in an engagement, the actual time of firing is very short, but the time of preparation for each practice is intensive. Officers and men live near their guns; all mechanical devices are carefully tested and kept in order; all are highly trained and in expectancy for the day scheduled. After that the tenseness somewhat subsides, but in a few days the training for the next form of practice begins.

Careful records are kept of each shot or salvo fired. Each practice necessitates a large observing party on the firing ship, not only for recording data, but to see that all safety precautions are observed. On the ship towing the target are the triangulation and camera parties. All records are afterwards collected, together with the hits on the target and the scores computed, and an analysis of the whole practice made. Besides the hits, it is desired to know the cause of the misses, whether the errors were in range finding, ballistic, sightsetting, pointing, spotting, or to any one of a number of other causes. The errors, patterns, and dispersion of the entire battery or broadside are desired, as well as that of any individual gun. In other words, it is desired to find out if the misses were due to personnel, material, or both. This applies not only to capital ships, but to all vessels, such as cruisers, destroyers, submarines, auxiliaries, aircraft, and applies to all the various forms of offense, such as guns, torpedoes, depth charges, bombs, etc. The use of aircraft is being developed and is destined to become an increasingly important rôle in naval warfare. Aircraft extend the scouting range, thereby furnishing earlier information of the enemy's movements and disposition. For gunfire observation they are necessary to obtain accuracy at long ranges. Fighting planes drive off the enemy aircraft and so obtain control of the air. Torpedo and bombing planes are used to attack enemy ships. At the same time the fleet is developing its defense against aircraft and the scores made in these practices are a part of the ship's gunnery competition.

At the end of the fiscal year the standing of the vessels of a class and of the divisions is arranged according to combined merit of all the practices. The leader in each class is awarded the gunnery trophy, to be held

until the next year. Letters of commendation are written to the officers, and cash prizes are given to the enlisted personnel.

Another test of a navy's efficiency is its ability to steam without breakdowns. Ships are often required to make long cruises. To steam requires fuel, coal or oil. So many weight factors enter into the building of a ship, and all weights are held at a minimum. In order to have a large steaming radius and at the same time limit the amount of fuel, every effort is made to save fuel and so get the most miles per ton. The competition not only stresses economy, but reliability. For every breakdown, inability to keep position when in formation or readiness to perform any required service a penalty is assigned. This striving for fuel economy and reliability constitutes the "engineering competition." All ships are assigned a fuel allowance, which every ship tries to attain or even to better. There is an established allowance for a ship at anchor, as well as for various speeds underway, and a ship's competitive standing is determined by her success in meeting the standard allowances and her ability to perform all assigned duties without casualty. The rivalry is keen, and this competition goes on day and night, week days and Sundays, from July 1 until June 30. A leaky steam or fresh water joint, the unnecessary burning of an electric light, all require extra fuel. On some ships scores are posted hourly and monthly averages of ships in the same class are watched with much interest. This engineering competition has not only brought about a tremendous saving in fuel, saving to the government hundreds of thousands of dollars, but it has also increased the steaming radius of our ships and their ability to maintain their position in the battle line—most distinct military advantages.

It may be interesting to make a comparison of the engineering performances of some of our ships. Taking, as an example, the average of all battleships for the fiscal years 1921-22 and 1925-26, there was a saving of about fourteen gallons of oil per mile while underway, and during the same period there was an average saving of forty-three gallons per hour at anchor. This large improvement represents the combined efforts of the ship personnel in its efficient operation and the Bureau of Engineering in the installation of modern auxiliaries. Again using these figures, all battleships in full commission in 1925-26 could have steamed 2,500 miles further than in 1921-22 using the same amount of fuel; adding to the amount saved underway, the amount saved at anchor, the battleships could have steamed 6,600 miles more in 1925-26 than in 1921-22. These figures represent real economies and show what care, attention and coöperation between the deck and engineer force and efficiency can do. As in gunnery, trophies are awarded the ships standing one in engineering and cash prizes are given the enlisted men who contributed most to the ship's success. Similar awards are made to the ship and personnel making the greatest improvement during the year.

From information at hand, it is indicated that, in general, all battleships have improved their records of last year. The same improvements hold in all other types of ships. These savings are of great importance in these days of economy. The Navy must accept its reductions with other governmental departments. To be efficient, the Navy must be mobile. Ships must steam to carry on their exercises. By operating more economically the budget reductions are in a measure made up.

Communications is another factor which affects a ship's efficiency. Messages must get through quickly and accurately. A commander-in-chief must be able to communicate at all times with any part of his command and the subdivisions of the command must also have ready an efficient means of communication. A commander-in-chief must be able to communicate with his surface vessels, his planes in the air, and submerged submarines. Like gunnery and engineering, communication in the fleet is on a competitive basis. Frequent tests are held in visual, radio and sound. Lately a great many tests have been made with the radio compass or radio direction finders in tracking other vessels and in determining their location.

Competitive rules are drawn up each year in Washington upon recommendation of the fleet based on its experience. Individual initiative is encouraged and there is strong competition between all units afloat. To officers, the winning of the gunnery or engineering pennant means commendatory letters from the Department; to the enlisted men it means additional pay.

The Washington Treaty makes it most important that our training of personnel and excellence of material be maintained at the highest degree of efficiency, but each year seeking a higher goal.

Our "Stake" *in* Sea Power

By CAPTAIN DUDLEY W. KNOX, *U. S. Navy (Retired)*

IT IS worth a moment's reflection that practically every great center of population in the United States is located close to easy water transportation. At such points we have concentrated about half of the total population of the country and much more than half of our aggregate wealth. Water transportation was a major consideration in the original location of each of these places, a cardinal element in its growth, and still remains a prime factor in its economic and general welfare.

The average citizen is cognizant of the important relation between transportation and the whole economic structure of the country. But he thinks of transportation almost exclusively in terms of railroads, trucks (and possibly river steamers) and seems to have little comprehension of the vital part which is played by shipping of ocean-going size. Why is it that all six cities containing over 900,000 inhabitants are closely accessible to large ships? Of the fifteen leading cities throughout the great length and breadth of this vastly rich country only two are not so accessible. Considering all cities numbering more than a quarter million we find that twenty-four are served directly by large ships as compared with seven which are not.

This is incontestable evidence, from even the greatest railroad country in the world, of the superior influence of shipping upon the material support of the nation and the development of its wealth. Here is concrete substantiation of the long held, and too often unheeded, contentions of American maritime citizens as to the inherently vital interest of their country in sea power.

It has become customary to rest the case for American mercantile sea power upon two premises: (1) the war reserves of merchant ships and personnel which are indispensable to the fleet, and (2) the dependence of the nation's economic welfare upon foreign commerce. Both of these premises are entirely sound. To the professional reader the first will require no comment.

So much has been said within the last ten years in elaboration of our inherent need of foreign commerce, largely carried in American bottoms, that an outline of the argument will be sufficient in this paper. The margin of our prosperity has long been measured by the volume of our foreign trade. Not only do we require large imports of a number of essential materials, such as nitrates, manganese, rubber, etc., to keep our farms and factories going, but also we must dispose of our own huge surplus production of other goods. Serious interruption of either imports or exports will inevitably bring privation to millions of Americans.

Unless we have an American merchant marine of substantial size, our foreign trade may be seriously interrupted, as it has been in the past, by conditions of warfare between other nations when their merchant ships are diverted to war uses or greatly reduced in number by war casualties or blockade. Moreover with the transportation of our goods in the hands of our commercial competitors we are always subject to the risk of commercial discrimination in various forms, including a ship boycott. The need of a navy to protect an American merchant marine is manifest, apart from any question of the Navy's rôle in national security and the upholding of American policies and interests.

Without minimizing the force of the foregoing perfectly sound justification for America insisting upon a large merchant marine and navy, it is the special purpose of this paper to emphasize an equally great "stake" in sea power derived from the necessities of our tremendous domestic commerce. Few people realize the extent of our so called "coastwise" traffic, its essentially ocean-going nature, the degree of dependence upon it of many major industries, and its inherent dependence in turn upon naval protection.

This "coastwise" traffic is in fact an internal, domestic trade, yet following long

external overseas routes and necessarily carried in ocean-going vessels. There is nothing analogous to or comparable with it elsewhere in the world except the so-called "overseas" trade between the various parts of the British Empire.

The British very properly dwell upon the peculiar geographical and economic structure of their empire which calls for the maintenance and protection of certain ocean trade routes, which are in a sense internal to the empire. Such needs form their principal "stake" in sea power, secondary to to that "stake" derived from purely foreign commerce. Upon these premises are based their constantly repeated and greatly emphasized plea for special rights on the seas.

Substantially the same argument with respect to maintaining internal trade over ocean routes is applicable to the United States, yet is rarely advanced apparently because it is not generally understood. The distance from England to Canada approximately equals that overseas from New England to Texas. The "leg" from England to India, or that to South Africa is closely matched by the distance from New England to Oregon, via Panama. From Australia to South Africa or to India, is a shorter sea journey than one from California to Massachusetts. From Maine to Alaska by water almost equals the distance from England to Australia.

As a natural corollary to the parallel in magnificent distances we have a corresponding similarity in size and types of ships employed in these two examples of overseas "internal" trade. They are in every sense ocean-going vessels, and bear no resemblance to the coastwise shipping of other nations. Even that of Great Britain, which next to the United States has the greatest "coastwise" tonnage, is composed principally of vessels much under 1,000 gross tons.

But the most striking feature of America's ocean-going internal trade is its great volume. Here is an index of its vital value to the nation's economic life and consequently of the extent to which it constitutes a "stake" in sea power. Excluding trade with the Philippines, and that on the Great Lakes, our aggregate domestic sea-borne commerce is close to 100,000,000 cargo tons per annum. This is substantially equal to our total cargo tons of imports from and exports to foreign countries by sea (excluding the Great Lakes) in ships under all flags. What is much more surprising is that this purely domestic ocean-going trade of the United States is also nearly equal in weight and ten per cent greater in value than the total foreign trade of Great Britain! It is manifest that all the customary arguments as to America's interest in sea power, based exclusively upon her foreign trade must greatly understate the case. Such was an article appearing on January 14, in the London *Engineering*, extracts from which were reprinted in the March, 1927, issue of the Naval Institute Proceedings.

America's great coastwise artery of trade is in fact even greater than stated above. There are many ships under the convenient fiction of a foreign flag which form a part of American coastwise traffic in every real sense. Such are many fruiters plying exclusively between the Caribbean and our ports. Such also are many tankers out of Mexico. These should be included in our computation if coastwise traffic is to be properly evaluated, in which case the above totals for the United States must be increased by about twenty-five per cent.

It will be worth a moment's consideration to get a general idea of the relation between our "coastwise" trade and some of our major industries, bearing in mind that its bulk forbids diversion to railroad carriage in the event of the blocking of sea lanes. If we examine a map of the pipe lines of the country we see that most of them lead to the coast. Probably less than ten per cent of the great oil refineries are not within easy access to deep salt water, even though many of them are hundreds of miles from oil fields or pipe lines. The degree to which the giant oil industry depends upon ocean transport is obvious. This dependence will become increasingly greater as domestic sources are reduced and "crude" oil must be imported from South America and elsewhere.

The welfare of our far northwestern states largely hinges upon lumber export to and coal import from the eastern seaboard. The sea route via Panama is the cheap transportation link without which both industries would suffer. The great coal movements partly by water to New England and to the north central states have an important bearing upon our economic life.

The southern cotton growers, from Texas to the Carolinas, in common with New England mills, are well served by "coastwise" traffic, as are also the grain and fruit growers in many sections of the country.

We may point finally to the giant steel business as one of the major industries to which shipping is a great beneficiary, entering into ultimate costs in a surprising degree. We have not only the tremendous ore movements on the Great Lakes and the Atlantic seaboard to point to, but also the transport of finished products in which the Panama Canal is becoming a great factor. Many lesser industries are similarly dependent upon our domestic merchant marine which in the aggregate constitutes a cardinal element in the economic life of the nation.

Very few Americans have any true appreciation of the extraordinary volume of our domestic seaboard commerce, or of its potent influence upon most of our great industries, and are therefore quite unable to appraise the consequences of its serious interruption. The blocking of the great traffic lanes along our coasts, including the routes through the Panama Canal, unquestionably would gravely dislocate the business of the entire country and bring upon us "hard times" on a scale beyond anything in the nation's experience.

The security of our coastwise shipping in fact constitutes a cardinal reason, seldom advanced, for the maintenance of a large navy. Within the last few years we have read many columns of sound argument showing why Great Britain needs numerous swift strong cruisers for the protection of her far-flung vital routes to the dominions and foreign countries, yet scarcely a word have we seen as to a similar American need with respect to equally long ocean routes for a greater American internal commerce.

In only one sense is the British trade less vital than our own. We are better able to grow on our own soil the food necessary to put into our mouths. That would be of little solace to the millions of American mechanics, factory hands, miners, and other industrial wage earners, if thrown out of work by a stoppage of our ocean transport. Moreover the theoretical danger of actual starvation in Britain appears to be usually exaggerated. The development of her home agriculture is not comparable to that of other densely populated European countries. The local fishery resources are immense and susceptible of greater development along scientific lines. Her line of communication to Canada is secure against any equal European fleet. Her communications to South America, South Africa, and Australia are secure against an equal American fleet. Finally she has the whole continent of Europe close at her back from which to draw food. The danger of starvation theory certainly will not bear analysis in an argument for British naval power in excess of the 5-5-3 ratio.

If there are any good grounds for changing this ratio cold logic would favor an American rather than a British superiority, since an underlying principle of the ratio agreement was that each country should have sufficient naval power for defensive purposes without any overbalancing power of aggression.

The fact is that on a basis of naval equality between America and Britain, the latter is much better able to protect her interests against the former than is the reverse true. British aggression against America is possible on an important scale, without any corresponding power of aggression on the part of America.

By virtue of the British system of naval bases in the western Atlantic (Halifax, Bermuda, Jamaica, Trinidad and other potentially valuable possessions), a British man-of-war, built ostensibly for the defense of British trade, is equally available for purely offensive use against American coastwise traffic, not to mention foreign trade. On the other hand, the complete absence of American bases in the eastern Atlantic denies American ships any parallel advantage.

As against Great Britain an equal American Navy would have no choice but to operate almost exclusively in home waters on the defensive. Our tremendous and economically vital "coastwise" traffic would have to be protected. For us the principle of "a vigorous offense being the best defense" could not be applied for want of naval bases. For Britain the application of the principle would seriously interrupt all of our great arteries of trade while at the same time insure the virtual freedom of the seven seas both to her essential trade and to her great purely commercial trade.

It is therefore manifest that the rarely mentioned, seldom considered, little appreciated, but nevertheless immensely important, American "coastwise" trade, not to mention an additional foreign trade of no mean proportions, constitutes a cogent reason, a compelling argument, for an inherent "stake" in sea power, superior to that of any other nation.

The Lack *of* Modern Tonnage *a* Severe Handicap *in the* Expansion *of our* Foreign Trade *and* National Defense

By ALFRED H. HAAG

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ONLY a small percentage of our population fully appreciate the importance of an adequate number of American-flag ships to carry our foreign commerce and to serve as a naval auxiliary in times of national emergency.

It might be of interest to know that in 1830, American ships engaged in American foreign trade carried almost ninety per cent of our commerce which declined until 1910 when it was less than nine per cent. In 1920 we increased the carriage in American ships to almost forty-three per cent. In 1924 it dropped again to slightly over thirty-six per cent; in 1925 it was just above thirty-four per cent, and in 1926 approximately thirty-two per cent. At this rate, within sixteen years our flag will disappear from the seas.

The high percentage we carried in 1920 was due principally to the fact that competitor nations had not fully recovered from the effects of the World War and we, having a war-built fleet available, were able to transport almost forty-three per cent in American-flag ships.

Our competitor nations were quick to realize the importance of acquiring and constructing modern tonnage and to act upon it with the result that the carriage of our commerce is being gradually but surely diverted to foreign-flag vessels.

The erroneous idea prevails that America, during the war period, built a huge merchant

SUMMARY OF NAVAL AND MERCHANT TONNAGE

Shipbuilding Activities of the Principal Maritime Nations for the Past Five Years

Laid down or appropriated for, contracted for, built and building

COUNTRY	NAVAL VESSELS		MERCHANT VESSELS*	
	No. of Vessels	Displacement Tons	No. of Vessels	Gross Tons
United States	19	150,909	18	199,884
British Empire	37	285,795	741	4,588,847
Japan	101	339,201	71	350,556
France	96	221,828	80	507,239
Italy	46	102,207	91	805,945
Germany			221	1,348,533
TOTAL	299	1,099,940	1,222	7,801,004

* Oceanic vessels of 2,000 gross tons and over.

March 31, 1927

SSELS*	
Gross Tons	
99,884	
88,847	
50,556	
07,239	
05,945	
48,533	
01,004	

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marine for the purpose of competing in world trade routes. But, contrary to this belief, such was not the case.

When the United States entered the war she was called upon to build a "bridge of ships" to carry troops and war supplies and to overcome the destruction of ships due the ruthless submarine warfare.

The shipbuilding program involved, besides ships, the construction of modern cities, housing facilities and shipbuilding plants, and the training of men in the intricate art.

Irrespective of the sums expended in this colossal undertaking, the hoped-for result was accomplished—breaking the morale of the enemy. We spent approximately 3,000 million dollars up to the time the Armistice was signed in producing ships for the sole purpose of building the "bridge of ships" to Europe with no thought of world competition thereafter.

The amounts expended in the building of ships and establishment of cities, shipyards and subsidiary industries involved in the production of those ships, should be classed as a war expenditure in the same sense as the ammunition used at the front. This, in a large measure, is the price we paid for neglecting deep water shipping since the Civil War era.

In the face of economic handicaps other maritime nations have made every effort to retrieve their shipping, as well as to increase their naval tonnage. In the past five years they have made rapid progress which is shown in the tables given here.

Of merchant vessels actually completed during the period from 1921 to 1926, the principal maritime nations built for trans-oceanic service vessels of 2,000 gross tons and over, totaling approximately as follows:

Country	*No. of ships*	*Gross Tons*
Great Britain	599	3,500,000
Germany	172	950,000
Italy	63	506,000
France	72	450,000
Japan	52	250,000
UNITED STATES	14	137,000
Total	592	5,793,000

Or for every single ship of this class that the United States has built Great Britain has approximately forty-two; Germany, twelve; France, five; Italy, four, and Japan, four.

Of ships building or contracted for at the present time, of the same class and service, the records disclose the following:

Country	*No. of ships*	*Gross Tons*
Great Britain	142	980,000
Germany	49	395,000
Italy	28	300,000
Japan	19	100,000
UNITED STATES	4	63,000
France	8	58,000
Total	250	1,896,000

Or for every single ship of this class that the United States is building or has contracted for at the present time Great Britain has thirty-five; Germany, twelve; Italy, seven; Japan, five, and France, two.

Another striking comparison is in the number and speed of vessels of 2,000 gross tons and over suitable for trans-oceanic service registered under the flag of the principal maritime nations.

SHIPS OF TWELVE KNOTS AND OVER

Country	*No. of Ships*
Great Britain	1,280
France	277
UNITED STATES	235
Japan	206
Italy	186
Germany	153

In this class we rank third, being outclassed by our principal competitor, Great Britain, five to one.

SHIPS OF FOURTEEN KNOTS AND OVER

Country	*No. of Ships*
Great Britain	435
France	105
UNITED STATES	101
Japan	56
Italy	55
Germany	29

We rank third in this class, being outnumbered by Great Britain four to one.

SHIPS OF SIXTEEN KNOTS AND OVER

Country	*No. of Ships*
Great Britain	145
France	55
UNITED STATES	37
Italy	27
Japan	10
Germany	9

Here we rank third, Great Britain outclassing us about four to one.

SHIPS OF EIGHTEEN KNOTS AND OVER

Country	*No. of Ships*
Great Britain	38
France	19
Italy	9
UNITED STATES	6
Japan	2
Germany	2

We rank fourth in this class, outnumbered by Great Britain better than six to one.

SHIPS OF TWENTY KNOTS AND OVER

Country	*No. of Ships*
Great Britain	12
France	11
Italy	9
Japan	2
UNITED STATES	2
Germany	1

And in this class Great Britain attains an advantage of six to one.

The foregoing should convince the most skeptical of the urgent need for modern and faster ships to meet the existing and future world-wide competition.

It is certain that if the United States is to continue as a factor in world shipping, a replacement program of modern competitive types of ships is imperative. This is a very serious question in view of our higher costs of ship construction as compared with those abroad.

The American shipbuilding industry today is in a most deplorable condition due to the lack of merchant ship construction and on account of the limitations placed on naval construction. A new construction program is urgently needed, not only to meet competition in the world's trade routes but to save our shipbuilding industry. If long delayed we will have no ships and no yards in which to build them.

The question is often asked—does America require a merchant marine? This can best be answered by the Socratic method: Should a country whose wealth is estimated at 400 billion dollars with an international trade of ten billion dollars annually, with a freight bill for transporting this commerce of 600 million dollars, whose prosperity is dependent on its ability to dispose of its surplus products in the world markets and which is largely dependent on its imports of raw materials in the operation of many of its industries, rely on other countries to carry its commerce and expand its foreign trade?

It requires no student of economics to answer that question. Past and recent experiences have proven to us that we cannot rely on foreign-flag ships for this purpose.

Dependable and uninterrupted ocean transportation can only be assured our nation by an adequate number of efficient American-flag ships. America can no longer afford to depend on other nations to move her commerce when, as, and if it suits their convenience. No business can succeed that depends on its competitors to make its deliveries.

There is only one economic method of expanding our foreign trade and that is by transporting the greater portion of it in American manned and American owned ships which can render services on an equality with those of our competitors.

The question arises—have we a shipping policy? The policy of the United States appears to be very clear. The first portion of the opening paragraph of the Merchant Marine Act of 1920 very clearly and definitely states:

> Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it is necessary for the national defense and for the proper growth of its foreign and domestic commerce that the United States shall have a merchant marine of the best equipped and most suitable types of vessels sufficient to carry the greater portion of its commerce and serve as a naval or military auxiliary in time of war or national emergency, ultimately to be owned and operated privately by citizens of the United States; and it is hereby declared to be the policy of the United States to do whatever may be necessary to develop and encourage the maintenance of such a merchant marine.

Section 7 of the same Act distinctly states:

> That the board is authorized and directed to investigate and determine as promptly as possible after the enactment of this Act and from time to time thereafter what steamship lines should be established and put in operation from ports in the United States or any Territory, District, or possession thereof to such world and domestic markets as in its judgment are desirable for the promotion, development, expansion, and maintenance of the foreign and coastwise trade of the United States and an adequate postal service, and to determine the type, size, speed, and other requirements of the vessels to be employed upon such lines and the frequency and regularity of their sailings, with a view to furnishing adequate, regular, certain and permanent service. The board is authorized to sell, and if a satisfactory sale can not be made, to charter such of the vessels referred to in section 4 of this Act or otherwise acquired by the board, as will meet these requirements to responsible persons who are citizens of

the United States who agree to establish and maintain such lines upon such terms of payment and other conditions as the board may deem just and necessary to secure and maintain the service desired; and if any such steamship line is deemed desirable and necessary, and if no such citizen can be secured to supply such service by the purchase or charter of vessels on terms satisfactory to the board, the board shall operate vessels on such line until the business is developed so that such vessels may be sold on satisfactory terms and the service maintained, or unless it shall appear within a reasonable time that such line can not be made self-sustaining.

This is the law on the subject, and the intent of this Act seems to have been very definitely and faithfully carried out by the United States Shipping Board which is entrusted with the duties imposed by the Act.

The records disclose that it has sold at the most reasonable rates and terms the ships built and owned by the American people for war purposes to private American interests as rapidly as they could be induced to take them.

In accordance with the Act it *has* established trade routes and services. It *has* endeavored and still *is* endeavoring to sell these services on the most liberal terms to private American interests and in the meantime is building up and operating them and will turn them over to private interests whenever they are in a position to purchase them. In the meantime American-flag ships are kept on the high seas rendering service to the nation's shippers as can be done in no other way.

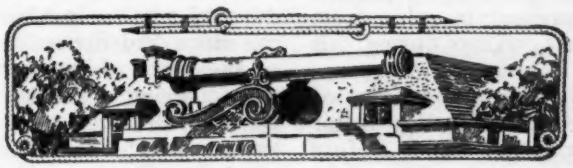
Considering the many obsolete vessels the Shipping Board is operating in the world's trade routes in competition with the newer, faster and more modern vessels of our competitors and the comparatively short time the government has been operating ships, the Shipping Board is to be complimented, rather than criticised, for its sincere and untiring efforts under the circumstances, in placing American shipping where it is.

The outstanding problem before us is how will the new ships be provided. Private American shipping interests cannot be expected to absorb the higher capital costs of building ships in the United States under prevailing conditions due to our higher living standards.

The United States Shipping Board is not vested with the authority to build new ships.

The Merchant Marine Act specifically states it to be the policy of the United States to do whatever may be necessary to develop and encourage the maintenance of a merchant marine of the "best equipped and most suitable types of vessels."

How this policy can effectively be carried out should receive immediate and serious consideration at the next session of Congress for definite action, if American shipping is to survive.



The Merchant Marine

Its Value in Peace and War

By CAPTAIN L. M. OVERSTREET, *U. S. Navy*

THE American people are quick to grasp business opportunities. It seems curious that they should be so slow to grasp the value of a merchant marine. The merchant marine has great value to us, not only when the world is at peace, but when we are neutrals, or when we are at war.

THE WORLD AT PEACE

The writer has recently spent four years with the Naval Mission in Brazil. In addition to traveling through the interior of Brazil, along the entire sea coast, and for a thousand miles up the Amazon, he has traveled through Paraguay, Uruguay, Argentina, Chile, Bolivia and Peru.

Our trade with the other twenty Pan-American countries, has increased tremendously in the past twelve years. Our imports from Brazil alone have increased in value during this period from $100,000,000 to $220,000,000, while our exports to Brazil have increased in value from $30,000,000 to over $87,000,000. In 1925, for the first time Brazil began importing more goods from the United States than from any other country. Our exports to all twenty Pan-American countries have increased in value from $302,000,000 to $882,000,000, while our imports have increased in value from $435,000,000 to $1,041,000,000 during this twelve-year period.

The increase in the size and activity of our merchant marine has been a big factor in this increase of our foreign trade. Before the World War there were no American steamers of any consequence running from New York to Rio de Janeiro and to Buenos Aires. If an American wished to sail from New York for either of these great South American seaports he would have to spend nearly four weeks on a small foreign steamer, or else go via Europe. The people who lived in Brazil or in Argentina would not take the long disagreeable trip to New York, but would go by a good foreign steamer to Europe instead.

After the World War the Shipping Board put on four good steamers (since purchased and operated by the Munson Line), which made the trip from New York to Rio direct in twelve days. This forced the one foreign passenger line on this run to speed up, and to put on better ships to meet this new American competitor. It is clear that due to this Munson Line, service between New York and the great seaports on the east coast of South America has greatly improved. Hundreds of people from the United States and from South America are now exchanging visits. All this has greatly increased our foreign trade.

There are some who think we should have a number of small steamship lines, in order to have competition amongst our own ships. It is wise here in the United States to have a number of railway systems competing among themselves, in order to insure good service and cheaper rates. This does not apply to American steamships, as their competitors are foreign steamers.

This point may be illustrated by considering the exportation of Brazilian coffee. On November 18, 1926, some 5,000,000 bags of the 1926-7 coffee had been exported. American ships had carried twenty-two per cent of the crop, while other ships had carried the following amounts: British, nineteen per cent; Brazilian, sixteen per cent; Italian, ten per cent; Scandinavian countries, nine per cent; Dutch, eight per cent; French, seven per cent; German, seven per cent, and the remaining two per cent by Japanese and Belgian ships. The United States therefore has seven competitors in carrying coffee from Brazil.

We should consolidate all the ships running from the United States to the east coast of South America into one big line. We do have this condition approximately on

the west coast of South America. There are now some seven lines of American ships under the Grace flag running from the Atlantic, Gulf and Pacific ports of the United States to the west coast of South America.

We have a number of small American lines running from our United States ports to the east coast of Brazil. If these were consolidated into one big line, then a few of the ships could be allocated to take flour, kerosene, gasoline and barbed wire to the Amazon, and return with rubber and nuts. Others could take sugar, machinery, flour and automobiles to the eastern Brazilian states and return with cocoa and coffee. Still others should take coal and machinery to the southern ports of Brazil and return with coffee and manganese ore. A few could take automobiles and machinery to the Argentine, and return with hides, wool and flaxseed. There is a large foreign shipping company, having control of at least fifty ships, which does so allocate ships to suit various kinds of cargoes along the east coast of South America.

Many people think that if foreign ships can carry freight cheaper than we can, we should let them carry ours. Suppose the owner of one of our great city department stores found that a rival department store could run delivery wagons cheaper than he could. Can any one imagine that he would abolish his own delivery wagons, and turn this important function over to his rival? In such an event, would not the rival give preference to the delivery of his own goods?

This point can be illustrated by the rivalry between the United States and England in selling coal to Brazil. It is necessary for Brazil to import something like 1,500,000 tons of coal. During a recent year the United States sold Brazil 850,000 tons of coal, while England sold her 760,000 tons. It costs more to buy coal in Cardiff than it does to buy it in Norfolk. The distance from Cardiff to Rio is 5,020 miles, while from Norfolk it is 4,723 miles. As the British ships control the coal carrying trade the rate from Cardiff to Rio was $3.47, while for the shorter distance from Norfolk to Rio it was $4.04. A British paper published in Brazil openly stated that without the advantage of cheaper freight rates the whole Brazilian coal trade would go to the United States.

When the United States is Neutral

When the United States is neutral, repeated instances have shown that if we depend on a foreign power to supply merchant ships, and the power owning those ships goes to war, our freight may be left standing on the docks. We export some twenty-five per cent of the products of our farms, mines and factories, which is our surplus production. Many remember that when England withdrew her merchant ships during the South African War to serve her army in the field, that our American products were left on the docks. The same thing happened at the outbreak of the World War.

If we depend on foreign merchantmen to carry our products, we never know when we may suddenly be left without transportation.

The United States at War

When the United States entered the World War we soon learned that we could not transport our troops to France in our own ships. Fortunately, a large number of German ships had been interned in our harbors. We used these German ships to build up a great fleet of transports.

The British so appreciate the value of merchant ships that their government is having an official history of the war written by Archibald Hurd. This history is called the *Merchant Navy*. Another British official history known as *Seaborne Trade*, by Fayle, is being written.

In *The Merchant Navy*, we find that the British adopted a policy of arming their merchant ships a year and a half before the outbreak of the World War. On April 25, 1913, the first British armed merchantman, *Aragon*, of the Royal Mail, sailed for South America, armed with two 4.7-inch guns. By the declaration of war thirty-nine British merchant vessels had be similarly armed.

One of the most important squadrons of the British Navy was the "Tenth Cruiser Squadron." This squadron consisted of twenty-five armed merchant vessels. These vessels were superior to the old cruisers, for blockading purposes, as they were larger, more comfortable and had a larger steaming radius. They kept their blockading station in all kinds of weather, covering that stormy stretch of water from Scotland to Norway via Iceland. Thus we see that the real blockade of the German coast was carried

out by this squadron of armed merchant vessels.

There has been much propaganda in the press endeavoring to prove that a country having a large number of merchant ships, needs a large number of cruisers to protect them. What happens to merchant ships and cruisers upon a declaration of war? Merchant vessels must be kept in port until the cruisers get control of the sea. Upon the outbreak of the World War numerous English and German liners sought refuge in the nearest port to wait until the cruisers had gotten control of the sea.

After the nation with the greatest cruiser fleet gets control of the sea, then it is safe for the merchant ships to leave the port.

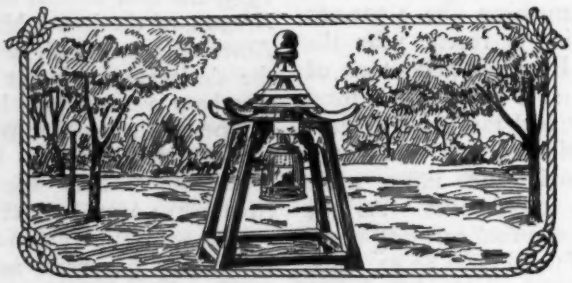
During the World War few merchant ships carried larger than 4.7-inch guns. However, provision was made in the treaty drawn up during the Washington Conference to strengthen the decks of merchantmen in time of peace, so that they could use 6-inch guns in time of a future war. This provision gives an enormous advantage to the power having the most merchantmen. The famous German raiding cruisers *Karlsruhe, Dresden* and *Emden* were armed with 4.1-inch guns. There were twenty-one German cruisers and gunboats, scattered throughout the Far East, the eastern Pacific, the western Atlantic and off the coast of Africa, but only two had guns greater than 4.1.

In a future war, when all big merchant vessels are armed with powerful 6-inch guns, they will not fear these small cruisers like the *Emden* and *Dresden*. When the German cruiser *Liepzig* appeared off San Francisco, all merchant ships were held in port from Seattle to Panama. The *Liepzig* was a small 3,000-ton cruiser mounting 4.1-inch guns.

This provision in the Washington Treaty therefore eliminates all of the old small cruisers and gunboats, and makes it necessary to build larger and more powerful cruisers.

During the Washington Conference the five powers debated for days, endeavoring to limit the total amount of warship tonnage to some 4,000,000 tons. These five powers have over 40,000,000 tons of sea-going merchant vessels. Doubtless the idealists would applaud wildly and declare all wars ended if the powers would agree to scrap their 4,000,000 tons of men-of-war today. Tomorrow they would "wake up," and find 40,000,000 tons of armed merchantmen.

As the various conferences succeed in reducing the number of men-of-war, by limitation agreements, the importance of the merchant marine increases. It is high time the American people realized that not only their security in war, but their prosperity in peace depends greatly upon the building of an efficient merchant marine.



Courtesy of Rear Admiral Philip Andrews, U.S.N., Chairman National Committee to Save "Old Ironsides" Fund, Navy Yard, Boston, Massachusetts

"OLD IRONSIDES" IN DRY DOCK, NAVY YARD, BOSTON

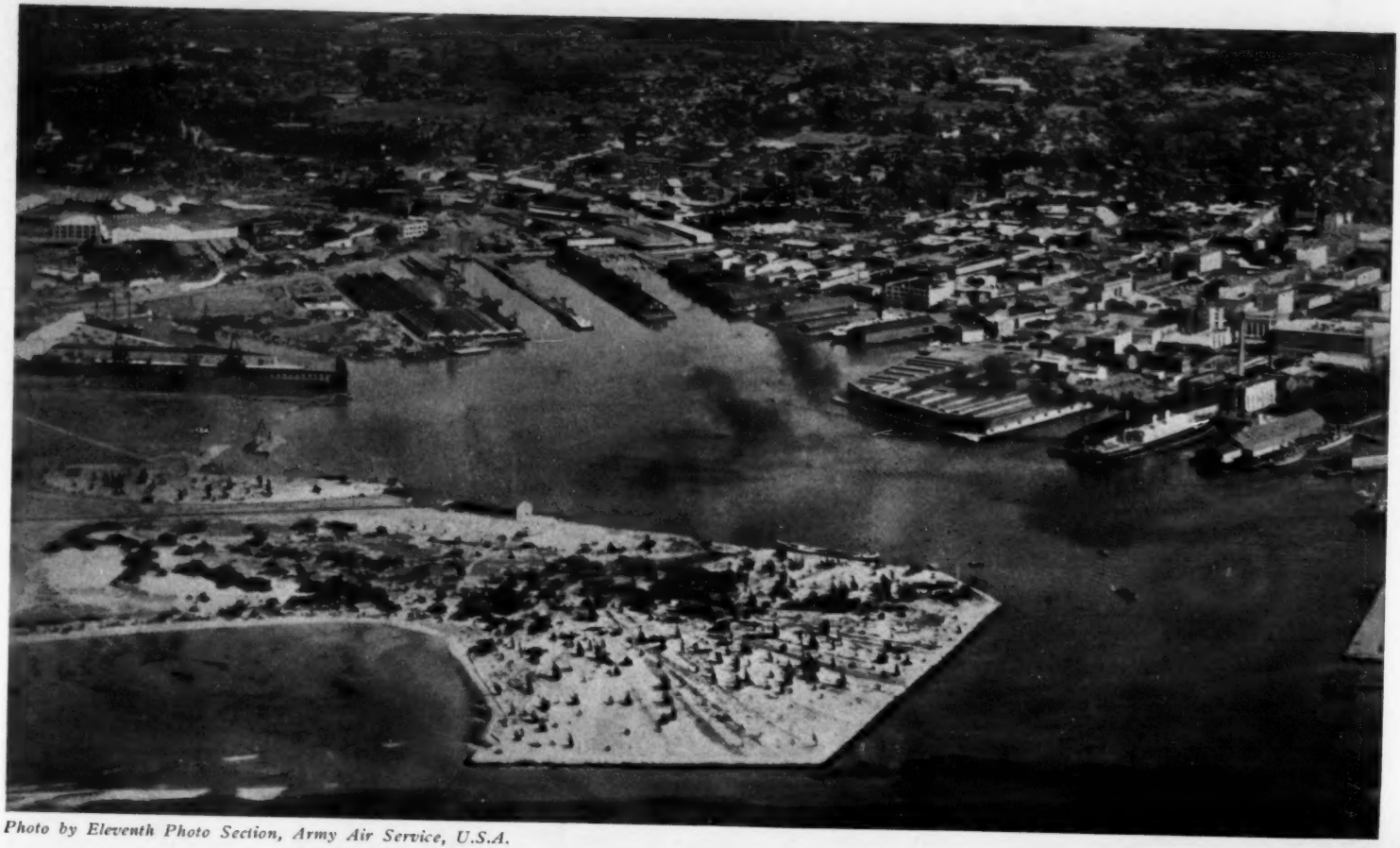


Photo by Eleventh Photo Section, Army Air Service, U.S.A.

HONOLULU, THE PACIFIC'S CROSSROADS

As seen from an Army airplane. This view shows only the harbor and business section. Famous Waikiki is four miles east (to right). Matson liners dock at Piers 8, 9 and 10, in the central right background, near the trans-Pacific liner, at Pier 7. Courtesy of the Matson Navigation Company.

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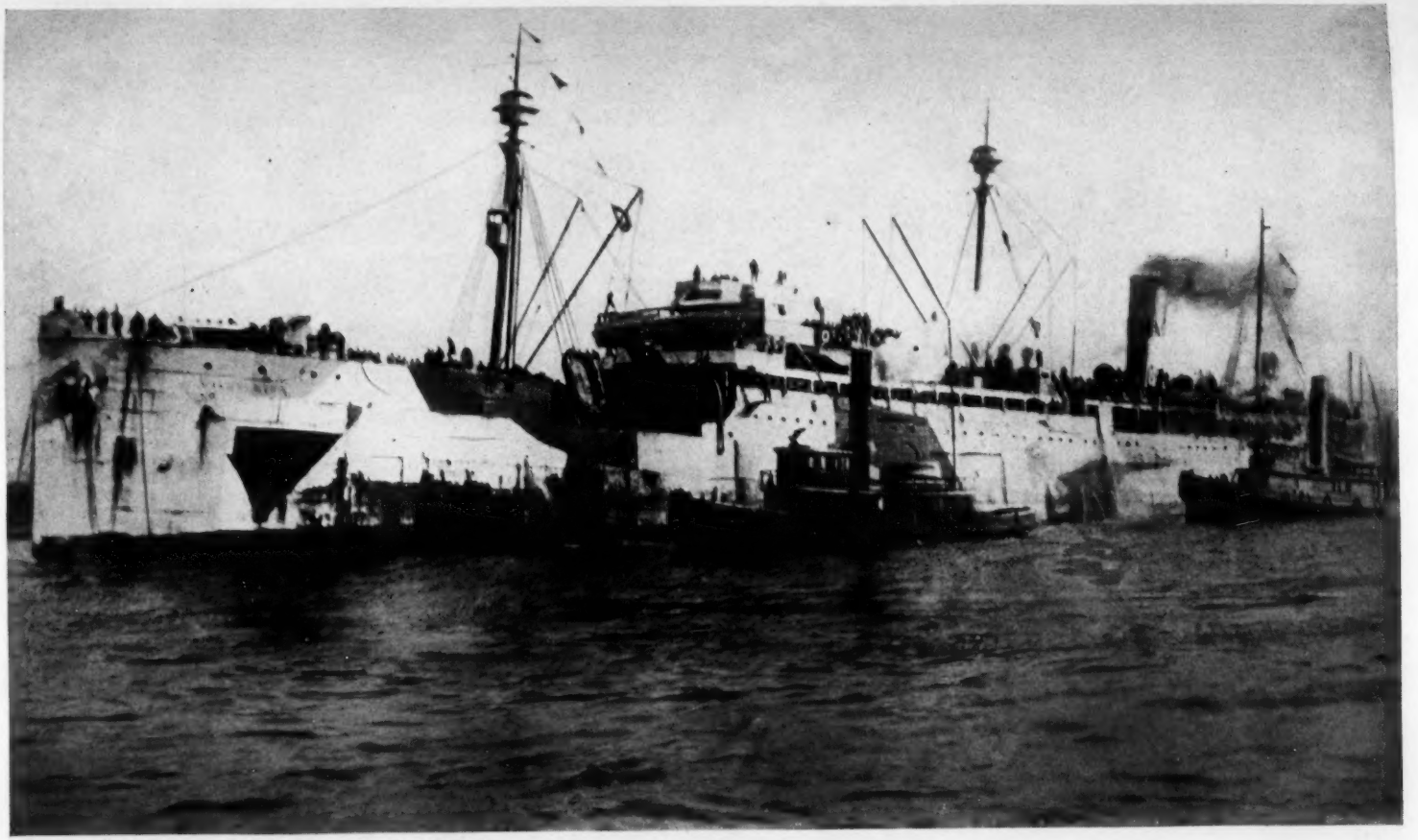
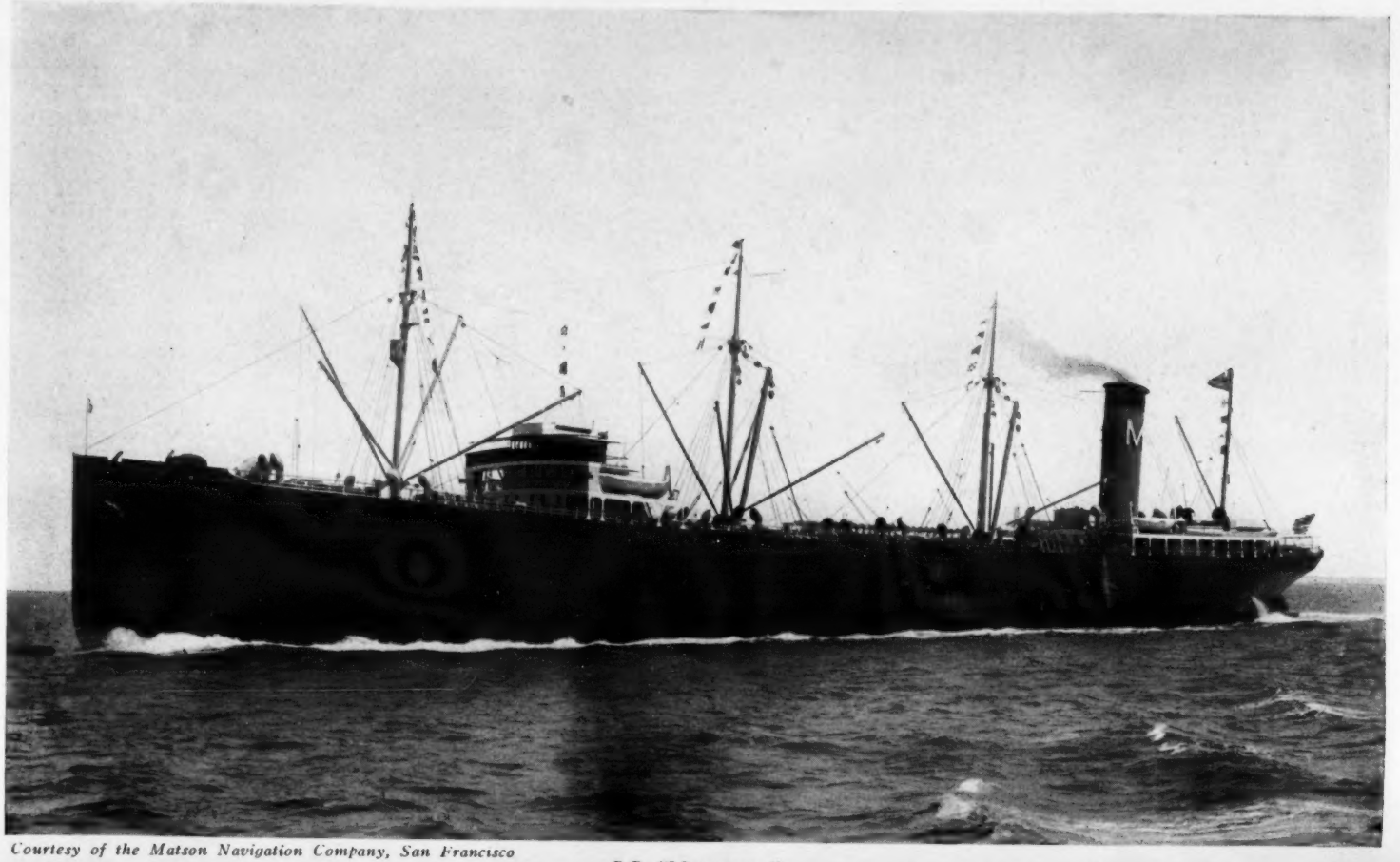


Courtesy of the Matson Navigation Company, San Francisco

THE MATSON LINER "WILHELMINA" IN U.S. TRANSPORT SERVICE, 1918-19

She carried thousands of troops to France and back, also tremendous cargoes of war supplies and fuel oil. The "Willie" oiled naval destroyers in mid-Atlantic during several voyages, and her alertness won her the title of the "Battling Willie" and "The Watchdog of the Convoy."



Courtesy of the Matson Navigation Company, San Francisco

S.S. "MANULANI"

The Matson freighters *Manulani* (Bird of Paradise) and *Manukai* (Sea Bird) carry 14,000 tons of cargo each, between the Hawaiian Islands and San Francisco. They are the two finest cargo ships running out of the Golden Gate to Hawaii, and carry raw sugar and canned pineapples.

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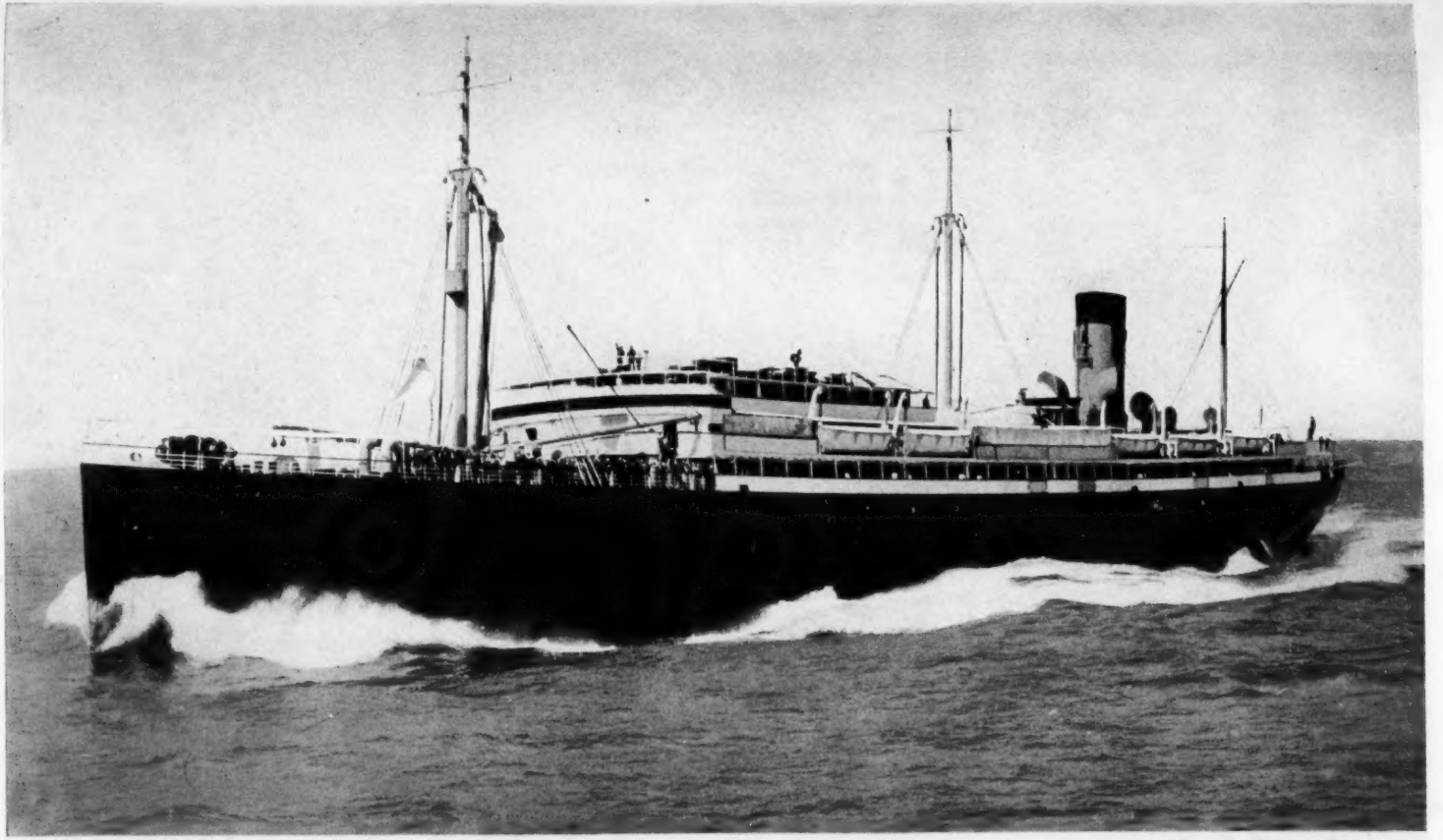
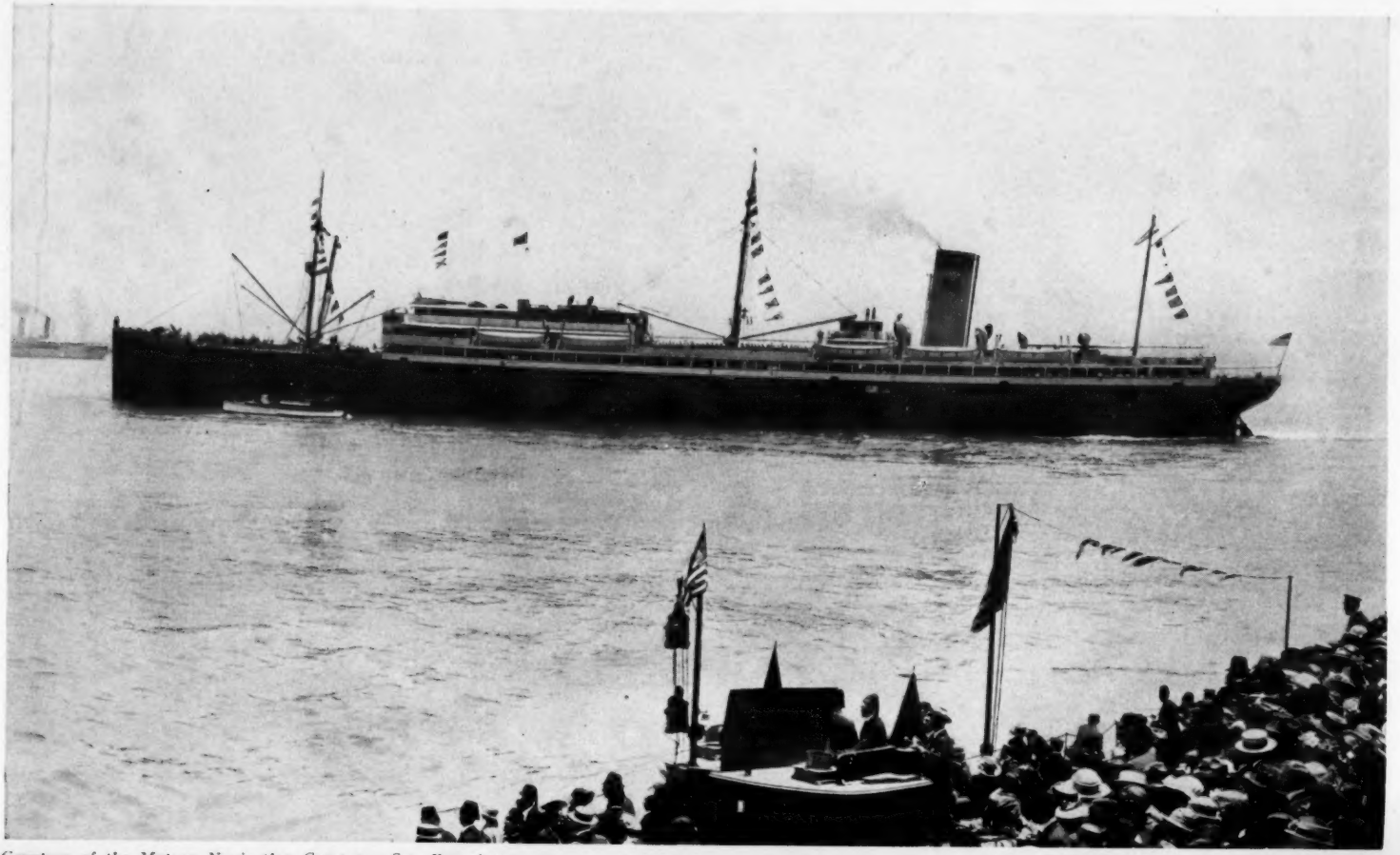


Courtesy of the Matson Navigation Company, San Francisco

MATSON LINER "MAUI" IN MID-OCEAN

The Matson liner *Maui*, named after the Polynesian demi-god, carries 250 passengers and 10,000 tons of cargo. She runs on a six-day schedule between San Francisco and Honolulu, and makes a side-trip each voyage from Honolulu to Hilo.



Courtesy of the Matson Navigation Company, San Francisco

MATSON LINER "MATSONIA"

Named after the late Captain William Matson, founder of the Matson Line. This ship, together with the *Mani* and *Wilhelmina*, helped win the World War by her usefulness in the U.S. Naval Transport Service.

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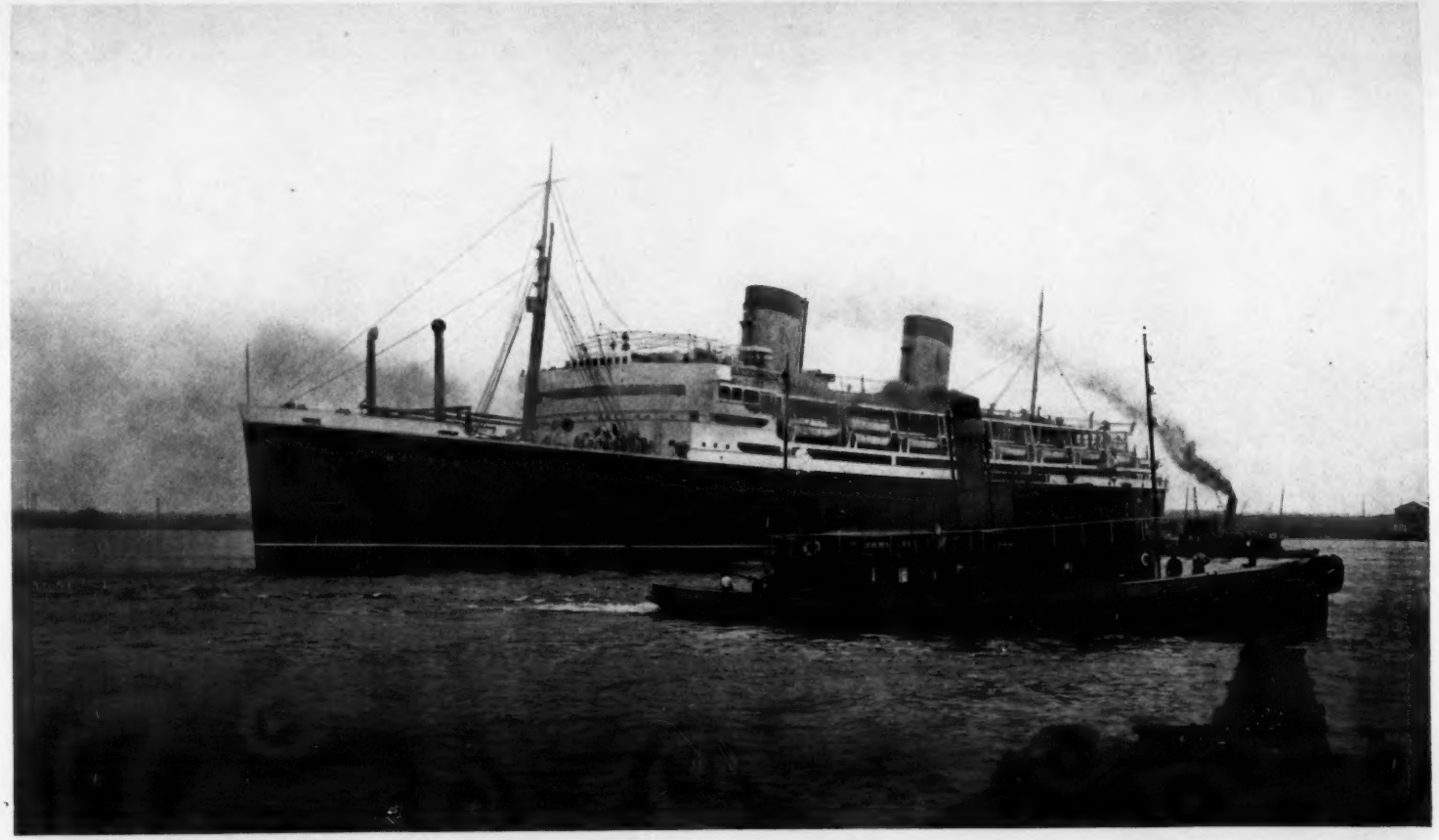

Courtesy of the Matson Navigation Company, San Francisco

THE NEW MATSON EXPRESS LINER "MALOLO" (FLYING FISH)

Queen of the Matson fleet, will make her maiden voyage from San Francisco to Honolulu in October. This new de luxe ship will make the run to the Hawaiian Islands in four days, which is a day and a half less than the present fastest Matson ship requires. The photo shows her at the Cramp Shipyard, Philadelphia, just before her trial trip.

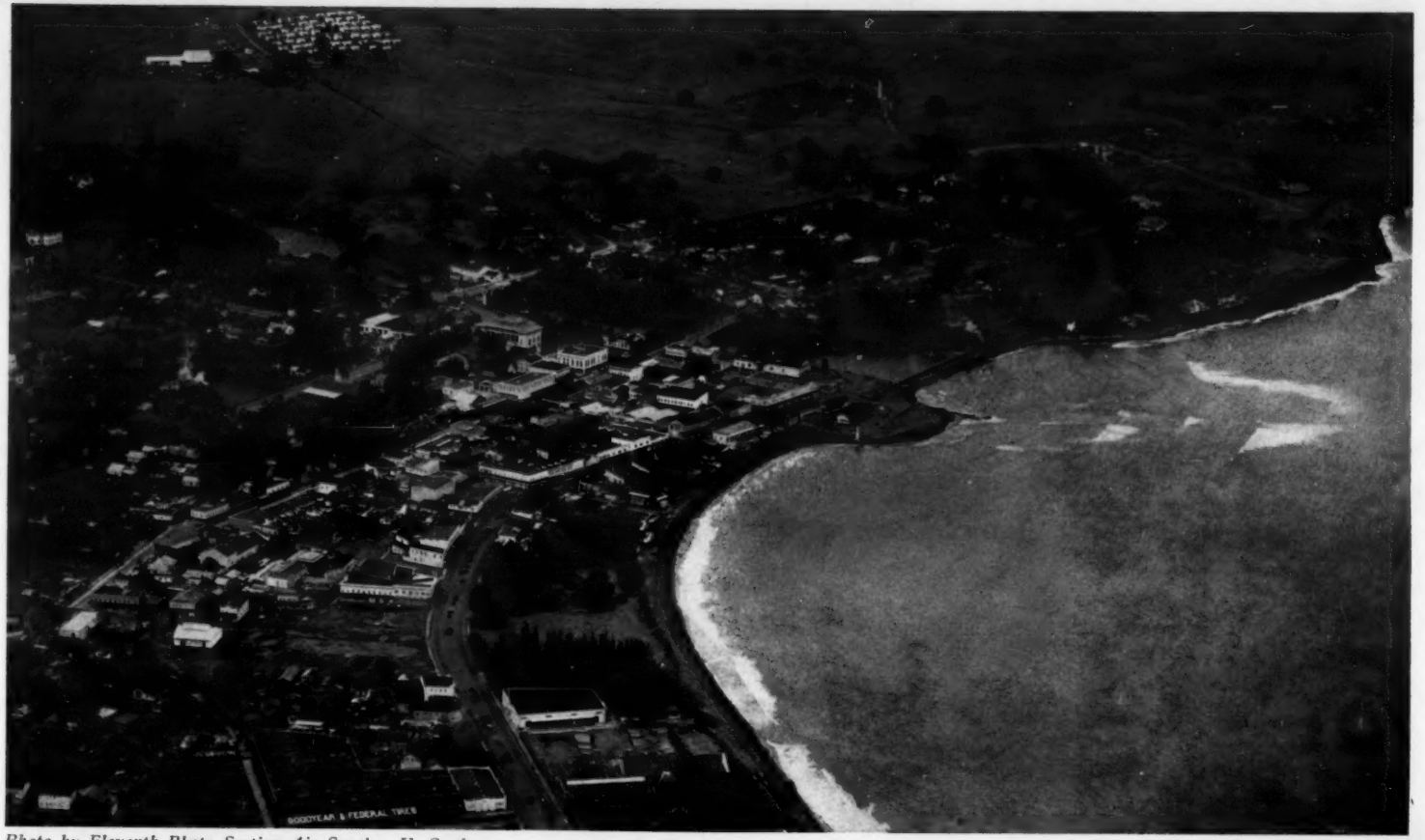

Photo by Eleventh Photo Section Air Service, U. S. A.

HILO, SECOND LARGEST PORT IN THE HAWAIIAN ISLANDS

This port is visited every two weeks by the Matson liners *Maui* and *Matsonia*. It is the port of debarkation for Kilauea Volcano and Hawaii National Park. Kuhio Wharf, where all shipping docks, is three miles to the right, out of the picture. Courtesy Matson Navigation Company.

Naval Civil Engineering—Its Place *in* National Defense *and its* Value *to the* Engineering Profession

By Rear Admiral L. E. Gregory *(Civil Engineer Corps), U. S. Navy*
Chief of Bureau of Yards and Docks

Photo by Eleventh Photo Section Air Service, U. S. A.

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MUCH has been said and written on the value of adequately equipped and strategically located naval bases. Some authorities have even endeavored to express this value in terms of capital ships but the impracticability of arriving at any fixed and definite ratio should be apparent. Such discussions, however, are enlightening as they emphasize the dependency of the fleet on its shore bases and their importance as an element of sea power. As a comparative illustration of the material relation, mention will be made of a ratio recently advanced giving the worth of an efficient base as the equivalent of six capital ships. This is surprising when it is considered that the total expenditure on our largest and best equipped navy yard for land, buildings, improvements and machinery, is only about the same or a little more than one capital ship.

This total investment is the result of many years of gradual building and expansion, and the yards, if properly maintained when once completed, will efficiently take care of the needs of the fleet for an unlimited time or until modern progress makes certain of the utilities obsolete. As an illustration of the long life of certain naval shore utilities mention may be made of dry docks at the Norfolk and New York Navy Yards, completed in 1834 and 1851, respectively, and in efficient operation today.

Probably the reader can better visualize the dependency by mentioning an analogy that should be familiar to every one. As an illustration assume a condition whereby there are no repair shops and service stations available to the millions of automobile owners of today. We must extend this and add that there are no factories for the manufacture of spare parts and sundry necessities needed for the maintenance and efficient operation of automobiles. The ultimate effect should be obvious. The dependency on the service stations would first be noted when the fuel supplies were exhausted. If service stations were available and the other two were not, the final results would be prolonged but they are inevitable. The machines would continue to run until they were in need of complete overhaul or were damaged by some breakage or through accident. Then the complete dependency on adequately equipped and efficient repair shops becomes apparent and without them our investments are of little value. Let us go a step farther and compare the results to be obtained between the work done by a makeshift or poorly equipped shop employing mediocre mechanics, and one fully equipped and manned by mechanical experts. A race or endurance test between machines turned out by both types of repair shops would without doubt give the same result as a major operation between two navies of approximately equal strengths, one having been conditioned for war by an inadequately equipped and manned for the work devolving upon it.
one efficiently designed, equipped and manned for the work devolving upon it.

Most of us who have not been in close contact with the United States Navy visualize it only from the standpoint of fighting ships. This is logical as the ships constitute our first line of defense ready to protect our shores and our commerce in time of war. But removed from this spectacle of monstrous fighting ships supported by cruisers, destroyers, submarines and airplanes are the service and repair stations and factories

needed to keep these combatant forces and auxiliaries in the highest state of efficiency humanly attainable.

The work of designing, constructing and maintaining these repair bases or navy yards and stations, as they are known to the service, is by law assigned to the Bureau of Yards and Docks and the work in the field is carried out by officers of the Corps of Civil Engineers. There is assigned to this corps, engineering work of the most varied nature embracing the fields of civil, mechanical and electrical engineering and architecture. It is believed that there are not segregated elsewhere under any one office or bureau the intricate and multitudinous engineering problems such as those confronting the Bureau of Yards and Docks and necessary for the proper construction, equipment, maintenance and repair of the fleet.

There are in active commission about 436 naval vessels of all classes and types having a displacement tonnage of over 1,500,000 and about 316 in reserve commission which can be made available for war duties on short notice. Shore stations of the naval establishment provide the homes and repair shops for this mighty armada. The necessity for the shore bases and the functions performed may be better understood by mentioning the varied character of engineering construction dealt with in their building. When the vessels of the fleet leave the high seas and enter the waterways leading to the navy yards they pass through channels which must be kept dredged to a sufficient depth to permit unhampered ingress and egress. Anchorage areas are provided, necessitating buoys, moorings, and dolphins with shore landings and floats for those ships which do not require immediate berthing space. For those that do there are provided the industrial piers for the fitting out of capital ships or for their repair. These piers are equipped with unusual weight-handling facilities in the nature of cranes capable of lifting battleship turrets, the gigantic 16-inch guns which may require relining, ship boilers, armor plate, etc. Distribution lines fed from a central power plant carry steam, electricity and air for those activities demanding them and when major repairs are made to ships these shore facilities are utilized for all purposes on shipboard in lieu of those with which all ships are equipped. Also, in cases of major repairs the crews must be taken care of on shore, requiring quarters, barrack buildings, kitchens and mess halls, dispensaries and recreational facilities. Supply piers are designed and equipped to handle the fueling of vessels, both coal and oil, and for the transfer of supplies from shore to ships. There are large storehouses stocked with all the requisite needs of the fleet and its personnel with transportation systems extending to piers to permit expeditious loadings. All vessels require periodic dockings for the removal of marine growth and repainting or repairs to hulls. Gigantic graving dry docks capable of docking any vessel afloat, floating docks, and marine railways for smaller craft, are available for these purposes.

Structures classed under industrial engineering heads, needed for the building, repair and maintenance of the fleet, cover a wide range and a mention of their character should give a clear conception of the functions performed and make their needs obvious. Under the heading of shipbuilding and repair plants are launching ways, weight-handling equipment of capacities ranging from one-half to 350 tons, structural shops, machine and electrical shops, sheet-metal, pipe and plumbing shops, wood-working shops, foundries, ordnance, armor and projectile plants, galvanizing plants and factories for the manufacture of mattresses, life-preservers, sails and sundry commodities. There are power generating plants supplying electricity, steam and air for all activities and gas plants for oxygen, hydrogen, acetylene and helium. Appurtenant structures for the industrial activities include office buildings, laboratories, storage buildings of various descriptions, power substations, locomotive and crane sheds, garages, turntables, transfer bridges, fire protection systems, dredges, steam shovels, coal and oil barges, miscellaneous handling equipment such as conveyors, elevators, chutes, etc.

Statements so far have been in reference to the principal structures embraced within the industrial activities that apply strictly to fleet maintenance and repair. There are unique problems encountered in the special and diversified structures needed to handle aviation units, submarine activities and ordnance manufacture and equipment. For the housing of aircraft there must be hangars for airplanes, dirigibles, and kite balloons. There are storage tanks for gasoline and oils, and for helium and hydrogen gases, mooring masts for lighter-than-air craft, an

aircraft factory at the Philadelphia Navy Yard for the building and testing of airplanes; and appurtenances such as power plants and equipment, distributing systems, shop buildings, transportation systems, etc. Submarine activities require specially designed piers and berthing spaces and battery overhaul buildings. Ordnance projects include factories for the manufacture of powder, guns and mounts, projectiles, torpedoes, depth bombs, mines, etc., all of which demand special storage, power and handling facilities.

Innumerable radio stations are located at the principal naval activities and outlying locations, the largest of which are sufficiently powerful to maintain direct communication with the fleet and shore bases no matter in what part of the world they may be found. Systems of radio compass stations are maintained along our coasts which provide invaluable aid to navigation, especially during storms and fogs. The sizes of the sending and receiving towers range in size from a series of 600-foot steel towers to small wooden or steel-guyed masts. Each radio station is equipped with its own power and generating plant and administration building.

The industrial shore activities cover sundry construction projects including electrical, mechanical, municipal and railroad engineering. Under electrical and mechanical engineering may be mentioned oil storage and pipe lines, coal storage and handling appliances, boilers, stokers, ash handling, generators, compressors, circulating loops, transformers, telegraph, telephone, signal and alarm systems, lighting, heating, ventilating, pumping plants, plumbing, elevators, weight and material handling equipment of various descriptions, and equipment and machinery for general construction and maintenance. Municipal engineering projects embrace water supply and purification, sewerage and sewage disposal, garbage and refuse disposal, streets and roads, bridges, causeways and upkeep and maintenance of grounds. Under railroad engineering are mentioned tracks, standard and crane, scales, yards and terminals, and miscellaneous rolling stock.

Passing from the strictly active phase of the engineering projects needed primarily for the fleet activities, an outline of the secondary projects essential for the housing and welfare of the naval and marine corps personnel ashore will be given. For the Navy there are quarters, training camps necessitating barracks, buildings, schools for the education of enlisted men in the artificer branches, mess halls, auditoriums, natatoriums, welfare buildings, and recreational facilities. At the Naval Academy will be found magnificent buildings used for the education and training of the midshipmen. Marine barracks and marine corps bases with all of their accessories are provided for the marine corps personnel. Naval hospitals or dispensaries are located at practically all of the shore activities. Hospital units in general consist of the ward and contagious ward buildings, administration building, subsistence building, sick officers' quarters, doctors' quarters, nurses' quarters, medical storehouse, power plant and laundry.

Lack of space restricts this article to more than a brief mention of the outstanding engineering activities of the Bureau of Yards and Docks. Multitudinous problems are being continually dealt with and it can be safely said that no two similar structures are identical in design, for all are influenced by uses and locations. Many important public works for the Navy have required pioneering and diversified designs and methods must be developed in advance of any guiding examples. These works when executed become precedents for the study of engineers in civil activities. The Bureau's administration of the gigantic naval shore investment has had tangible effects in the advancement of engineering practice and progress and the public may justly expect to feel actual economic benefits from its operations. Of first importance in the major special projects may be mentioned the graving dry docks. These tremendous reënforced concrete structures must be designed to withstand the outside pressures of water and earth and the construction involves deep excavations behind temporary cofferdams. An important feature of these docks is the floating steel caisson or gate with electrically operated pumping equipment, used to close the entrance. Powerful pumping plants, each pump capable of handling 100,000 gallons of water a minute, are necessary to unwater them. The unstable character of the subsoils found under certain of the naval dry docks have necessitated unique construction methods. As illustrations there may be mentioned one dock where quicksand was found in the excavation, and the structure

had to be designed to rest upon pneumatic caissons that not only support the dock when full of water but overcome the bouyancy and hold the dock down when it is empty, another where it was found necessary to build the body of the dock in transverse sections above water and sink them to their proper positions and join them together under water by an original method devised by the Bureau.

Floating steel dry docks have also received much attention and they demand original design to meet special military requirements. Cranes both stationary and floating of exceptional capacities and involving original designs have been built by crane builders under the Bureau's direction. The Navy was a pioneer in the field of radio communication and was the first to develop designs for gigantic 600-foot steel towers. For naval aircraft the bureau has been called upon to design and supervise the construction of the great hangar at Lakehurst, New Jersey, capable of housing two of the largest dirigibles ever built, and many smaller ones, as well as steel mooring masts and concrete runways by which seaplanes enter and leave the water at the hangars. Original work has been done in the design of reënforced concrete retaining walls and piers. The Navy was one of the first in this country to use high alumina (quick setting) cement, having used it in the reënforced concrete piers of the large fitting-out and repair pier at the Bremerton Navy Yard and in the seaplane runway at the Naval Operating Base at Hampton Roads, Virginia. The Bureau has designed and constructed large steel tanks of unprecedented size for the storage of fuel oil, these tanks being 164 feet in diameter and forty feet in height.

The helium production plant at Fort Worth, Texas, the first ever built, was constructed under the supervision of the Bureau. The design of this plant necessitated a comprehensive and prolonged study as to the economical method of developing and obtaining from natural gas this rare non-explosive buoyant for balloon and airship purposes. It had never, prior to the completion of the project at Fort Worth, been possible to produce this material in sufficient quantities at a reasonable cost to make its use of any commercial importance.

There has been constructed near Washington, D.C., a naval experiment and research laboratory to promote the scientific study of material and phenomena regarding which the Navy is especially concerned. This laboratory has and will no doubt continue to play an important part in the development of radio, aëronautics, depth finding apparatus, and similar activities, in all of which the public is interested.

The diversified locations of the naval shore establishments give the Bureau unusual opportunities to conduct service tests on miscellaneous construction materials under practically all climatic conditions, and the results obtained are communicated through various mediums to those interested. Activities located at and between the extremes of both coasts of the United States, on the Great Lakes, in Alaska, West Indies, Panama, South Seas, Philippines, Hawaii and Guam offer fields for investigations not directly available to commercial engineering enterprises. The Bureau is collaborating with the American Society for Testing Materials in conducting exposure tests on galvanized steel plates under the semi-tropical and salt air conditions at the Naval Station at Key West, Florida. The results of this test when compared with similar exposures being made on the New Jersey coast and in the dry atmosphere of the middle west, are expected to give valuable information on galvanized coatings. Exposure tests on miscellaneous paint materials are being conducted at the naval activities within the states and at several outlying locations. A difficult problem is offered in obtaining the best protective coatings for use under the hot, humid, salt air conditions in the tropics.

Coöperation has been extended and considerable work done in assisting the Marine Piling Committee of the National Research council in studying damages resulting from and methods to combat the ravages of the teredo or ship worm. This insect, especially active in tropical and south temperate locations, causes incalculable damages to wooden structures and has been known to completely honeycomb piles within a few months, causing their collapse. Some methods have been found that give reliable protection for a comparatively long period of time but they are not infallible. The Bureau is continuing its investigations of this very serious problem. Preparation is being made to extend facilities to the Department of Agriculture to conduct tests on various kinds of lumber

to determine their resistance to the ravages of white ants and the preservation of lumber to repel them. Unless one has lived in the southern states or in the tropics it cannot be realized the damage suffered to wooden buildings, furniture and miscellaneous wooden articles by these insects which bore through the fibers of the wood longitudinally completely destroying them. Tests, however, have demonstrated that certain species of cedar are not attacked to any large extent.

A number of important investigations and reports have been made by the Bureau on the use and deterioration of concrete in sea water. Results have been obtained on concrete of various proportions and mixes to determine the action of sea exposure, wind, temperature, and tide. An exhaustive and comprehensive test on a large number of concrete specimens is now being conducted at the Navy Yard, Portsmouth, New Hampshire, and it is expected that results of immense value to the engineering profession will ensue.

The Bureau's standards of design, construction, and inspection for miscellaneous types of construction and materials have been prepared after careful study and they have a bearing upon recent improvements in construction methods generally because of the volume and variety of work, wide territorial distribution, and the number of negotiating concerns.

The Bureau is coöperating with other government agencies and with outside engineering societies and committees on the standardization of construction materials and equipment and in the preparation of standard specifications. The Navy's requirements are large and it is obvious that the use of uniform specifications calling for the highest grade of materials is of a distinct advantage to commercial interests, in that it represents an advance notice to manufacturers of what may be required when the need arises. It is an incentive to them to manufacture and stock high grades of materials and inevitably leads to a simplification in the number of kinds of a particular product, thus making it possible for commercial buyers to purchase standard grades not otherwise obtainable. The Bureau's work in standardization covers practically the entire field of engineering materials and design and includes such headings as reënforced concrete, structural and reënforced steel, roofing materials, miscellaneous plumbing, electrical, and mechanical equipment, timber, cement, cranes, etc.

Officers of the Corps of Civil Engineers have frequently been given special details where the results of their work can be more directly viewed as being in the public's interest. For several years an officer of the corps served as consulting engineer to the Board on Rivers and Harbors in which capacity he performed inestimable service on the development of ports and navigable rivers. Another is serving on the technical committee of the President's Oil Conservation Board. Several are detailed as treaty engineers to the Republic of Haiti, where valuable work is being done in providing that republic with modern roads, seaports, public buildings and municipal improvements. A similar service has until recently been given to the Republic of Santo Domingo. Officers of the corps are detailed to the staff of the naval governors of Virgin Islands, Guam and Samoa where the larger part of their time is occupied on projects dealing directly with the welfare of the inhabitants of these island possessions.

The preceding descriptions of the work of the Bureau of Yards and Docks and its miscellaneous functions illustrate the necessity for its existence which is, in the first analysis, solely for the support of the fleet. The importance of the naval shore establishments cannot be over emphasized and their proper maintenance and upkeep efficiently to perform the duties devolving upon them is a matter of major importance to the public's interest. Our first line of defense is the insurance on one's freedom, one's home and one's country and this insurance should not be allowed to lapse. Those within the service can better estimate the Navy's needs and the actual protection the Navy affords. This may not be true of the majority of those equally protected but whose environment does not bring them into direct contact with the activities of the fleet and the naval shore establishments. In times of peace we are apt to disregard or not consider the advice of those in authority, even though the welfare of our country may be adversely involved.

Sea Power

By LIEUTENANT COMMANDER H. H. FROST, *U. S. Navy*

SEA power may be compared to a chain of three gigantic links: commerce, merchant marine, and navy. Its strength is no greater than that of the weakest link.

In past history, nations have pushed their way upward to commanding positions in two ways: first, by military power and second, by sea power. Sparta, Macedonia, the Roman Republic, Sweden, France, Russia, and Prussia owed their prominence to the aggressive use of military power. Tyre, Athens, Carthage, the Dutch Republic, and Great Britain have depended principally on sea power. The Roman Empire owed its stability to an almost perfect combination of military and sea power.

To Americans the development of overwhelming military power is repulsive; while the boundaries of the United States have been pushed westward across the continent by military power, the opposition of Mexicans and Indians has been so slight and the employment of our troops has been on so small a scale that to most Americans the military aspect of our conquest of the West has not been apparent. Due probably to our English tradition and republican ideals, military power, with its idea of strict discipline and compulsory regulation, does not appeal to Americans as a means of advancing our national interests consistent with our character.

The use of sea power as a proper means of increasing national strength and property does not meet with the same objections. We are today, as were our English forebears, a commercial people. While we do not believe in taking territory by force, we can see no reason why we should not compete for trade in every market of the world and why the door of every country should not be open to our traders. If successful in fair competition, it seems perfectly ethical that we should take the resulting commercial advantages for ourselves. If other nations use unfair methods in commercial competition, or if they dispute our commercial successes by force, then our traders feel perfectly justified in asking for the protection of their legitimate interests by force, and our government repeatedly has used the Navy to afford such protection. Thus, our expanding commerce has required a merchant marine for transport, and both commerce and merchant marine have required a navy for protection.

Let us follow the progress of sea power in the last centuries. The great voyages of discovery were made by the Portuguese and Spaniards. Both these powers were dominated by military rather than commercial instincts. Their ideas were rather to seize territory and enslave the natives than to engage in legitimate trade with them. Thus their conquests of Mexico, Peru, Brazil and the Philippines were rather military expeditions than the exercise of sea power. They had little commerce save forcing slaves to work in silver mines; no merchant marine save a comparatively small number of clumsy galleons manned largely by seamen of other nationalities; no navy save similar galleons on which were marched companies of troops, commanded by generals and colonels. The Spaniards and Portuguese had no instinct for the professions of the manufacturer, the merchant or the seaman. An old writer, referring to a later period, says:

> The mines of Brazil were the ruin of Portugal, as those of Mexico and Peru had been of Spain; all manufactures fell into insane contempt; ere long, the English supplied the Portuguese not only with clothes but with all merchandise, all commodities, even to salt-fish, and grain. After their gold, the Portuguese abandoned their very soil; the vineyards of Oporto were finally bought by the English with Brazilian gold which had only passed through Portugal to be spread throughout England.

The Dutch, on the other hand, built up real sea power. They were a commercial rather than a military race, and desired to trade with the newly-discovered peoples rather than conquer them. Great trading

companies were organized to support oversea commerce, and large sums were ventured in fitting out expeditions to the far corners of the world. So eager were they to open up new regions to trade and to discover shorter trading routes that, in the midst of a tremendous struggle for independence, their merchants were able to finance at great cost three expeditions to locate a route to China through the ice-fields and inhospitable seas which lay to the northward of the Eurasian continent. The Dutch merchant marine developed rapidly. Their ships were small, seaworthy, and well-handled. Their crews were real seamen.

As the Pope had divided the outlying areas of the world between Spain and Portugal, there was no "open door" for the Dutch merchants. There was none of the fair competition that we desire today. The Dutch had to be prepared to defend themselves while trading with native potentates, and thus their expeditions into the East Indies were both trading ventures and naval campaigns. Their fleets were prepared equally to trade or fight. Herman Wolfert and Matelieff de Jongh conducted splendid naval campaigns in addition to filling their holds with precious spices, and Jacob Van Heemskerk, with two little galleons, took a great Portuguese carrack richly ladened with the produce of China. While these combined trading and war vessels were able to hold their own in distant seas, at home the fleets of Spain, and later England, rendered it necessary that vessels be built exclusively for naval use in order to protect the merchant vessels as they commenced or returned from their extended cruises. The East Indies gradually came under Dutch protectorate, and the exclusive right to trade in those waters was another great asset to their sea power, as it developed commerce and provided naval and commercial bases.

Sea power built up the Netherlands into one of the great powers of Europe. Motley, somewhat condensed, thus described its potent influence upon this little country:

> The foundation of the national wealth, the source of the apparently fabulous power by which the Republic had at last overthrown her gigantic antagonist, was the ocean. The Republic was sea-born and sea-sustained. She had nearly one hundred thousand sailors and three thousand ships. The sailors were the boldest, the best disciplined, and the most experienced in the world, whether for peaceful seafaring or ocean warfare. The Republic had the carrying trade for all nations. Feeling its very existence dependent upon commerce, it had strode centuries in advance of the contemporary world in the liberation of trade. Every article of necessity or luxury known was to be purchased in profusion and at reasonable prices in the warehouses of Holland. In commerce, as in war, the naval supremacy of the Republic was indisputable. It was easy for the states to place two thousand vessels of war in commission, if necessary, of tonnage varying from four hundred to twelve hundred tons, to man them with the hardiest and boldest sailors in the world, and to despatch them with promptness to any quarter of the globe. It is customary to speak of the natural resources of a country as furnishing a guaranty of material prosperity. But here was a republic almost without natural resources, which had yet supplied by human intelligence and thrift what a niggard nature had denied.

In later years the Dutch merchants, rolling in unheard-of riches, forgot that sea power depended upon a navy, and that commerce and a merchant marine alone could not make a country prosperous and great. De Witt wrote in this period of Dutch decadence:

> Never in time of peace and from fear of rupture will they take resolutions strong enough to lead them to pecuniary sacrifices beforehand. The character of the Dutch is such that, unless danger stares them in the face, they are indisposed to lay out money for their own defense.

Once the British Navy, after a long succession of naval wars, was able to gain the edge over their Dutch opponents, the descent of the Netherlands from its position as a great power was inevitable and rapid.

England became a great commercial power slightly after the meteoric rise of the Dutch Republic. At that day, the English race was not so distinctly commercial as the Dutch, and had greater military instincts. Thus their seamen did not at first engage in distant trade to the same degree as did the Dutch. On the other hand, they devoted more of their energy to semi-piratical attacks on Spanish trade and on their outlying possessions, Sir Francis Drake being notable for such expeditions. The British thus at the time of the Spanish Armada were rather farther advanced in naval development than were their Dutch allies. The subsequent rise of Dutch sea power, however, soon inclined naval supremacy also to the Orange standard, and for many years the development of British sea power was held back by the overpowering competition of their continental rivals.

This rivalry between England and Holland for supremacy in sea power caused a

long series of wars in which the English finally proved successful. This was due largely to the internal deterioriation of the Dutch Navy toward the end of the seventeenth century. Once the Dutch Navy was vanquished, cruel navigation laws struck down her commerce and ruined her merchant marine. Her ships had to salute the British ensign when met on the high seas. As Great Britain's sea power rose to unparalleled heights its sagacious statesmen never neglected to increase the Royal Navy, keeping its development in step with the rise of their commerce and merchant shipping. The English had learned how these three great elements of sea power were dependent upon each other. Commerce made financial gains which supported the merchant marine and the navy. The merchant marine fostered commerce, supplied men for naval mobilizations and provided troop and supply ships for military and naval campaigns. The navy protected commerce and the merchant marine in both peace and war. The great colonial development of the British empire likewise strengthened and reënforced all three of these elements of sea power.

In the numerous wars of the two centuries ending with Napoleon's downfall in 1815 the Royal Navy became the leading element of British sea power, because it was vital to security, whereas commerce was vital only to prosperity. Thus we see the real purpose of the navigation laws was to maintain a merchant marine capable of supporting the navy in war. The fostering of peacetime commerce was a distinctly secondary mission. Whenever the two missions came in conflict the navy was given the precedence. In 1792 Reeves wrote:

> Our ancestors considered the defense of this island from foreign invasion as the first law in the national policy. Judging that the dominion of the land could not be preserved without possessing that of the sea, they made every effort to procure to the nation a maritime power of its own. They wished that the merchants should own as many ships, and employ as many mariners as possible. To induce, and sometimes to force, them to this application of their capital, restrictions and prohibitions were devised. The interests of commerce were often sacrificed to this object.

Due to this wise policy the carrying of British trade by vessels under foreign flags decreased from fifty per cent in 1651 to less than eight per cent in 1791.

On many occasions after our independence the British could have greatly increased their commerce had they permitted our vessels to carry their trade; they consistently refused this because of their fear that increase of our shipping would tend to reduce the number of British merchant vessels and seamen. In 1785 John Adams wrote:

> Their direct object is not so much the increase of their own wealth, ships, or sailors, as the diminution of ours. A jealousy of our naval power is the true motive, the real passion which actuated them. They consider the United States as their rival, and the most dangerous rival they have in the world.

The British also were greatly concerned that their merchant seamen should join our ships because of the higher pay and thus deplete the personnel supply for their fleets. This is the reason they so strongly insisted on the right to impress English seamen on American ships. So vital was this policy to Britain's security that rather than yield they submitted to the adverse commercial effects of Jefferson's embargo and eventually to the disadvantages of war with the United States when Napoleon, at the height of his power, was commencing the Russian campaign with half a million men under his eagles.

From the very date of their founding the American colonies took to the sea. Their people were seafaring by nature, their precarious hold on the coast depended on their shipping, and forests of America provided the finest timber for planking, beams, and spars. For many years every pine tree over two feet in diameter was marked with an arrow and reserved for the spars of the Royal Navy. Tar, pitch and turpentine were available in unlimited quantities. As early as 1639 New England exempted shipwrights from compulsory military service. In 1668 Sir Joshua Child wrote:

> Of all the American plantations, His Majesty has none so apt for the building of ships as New England; nor none comparably so qualified for the breeding of seamen, not only by reason of the natural industry of the people, but principally by reason of their cod and mackerel fisheries, and in my opinion there is nothing more prejudicial and in prospect more dangerous to any mother kingdom than the increase of shipping in her colonies, plantations or provinces.

In 1698 a colonial governor wrote:

> I believe I may venture to say there are more good vessels belonging to the town of Boston than to all Scotland and Ireland unless one should reckon small craft, such as herring boats.

In 1700 Boston had 194 seagoing vessels and New York had 124. In 1769 the col-

onies built 389 vessels of 20,000 tons and shipbuilding increased until in 1772 the total tonnage built was 26,544. One-third the vessels flying the British flag were of American construction. When the Revolution broke out Massachusetts had one seagoing vessel for every 100 inhabitants.

During the war our merchant vessels became privateers and, according to Maclay, took three times as many prizes as did our small and generally inefficient Navy. In 1781 there were no less than 449 American privateers scouring the oceans. The war, of course, practically destroyed our commerce and during the uncertain years until the adoption of the constitution our shipping dwindled and our Navy was abolished.

It may be well imagined that we received scant encouragement from Great Britain now that we were independent, when even as colonies the mother country kept our wings clipped. A cynical speech by Lord Sheffield in Parliament in 1784 well shows the British viewpoint. He said:

> It is not probable that the American States will have a very free trade in the Mediterranean. It will not be to the interest of any of the great maritime powers to protect them from the Barbary States. If they know their interests, they will not encourage the Americans to be carriers. That the Barbary States are advantageous to maritime powers is certain.

After the adoption of the Constitution the Congress by the Act of July 4, 1789, laid the foundation of our merchant marine by establishing a tariff on imports and allowing a discount of ten per cent on such duties where the goods were imported in vessels owned and built by American citizens. To specially encourage the tea trade the duty on this product when imported in foreign bottoms was made over twice as much as when carried by American ships. The merchant marine grew like a mushroom as a result of this act. "The growth of American shipping from 1789 to 1807," said Mr. H. C. Adams, "is without parallel in the history of the commercial world." The little town of Salem in 1807 alone had 252 vessels of 43,570 tons.

This wonderful expansion was due to several causes. First, our people were seamen by instinct. Second, we had excellent resources for ship building. Third, the great wars in Europe, involving practically all the nations, gave neutrals a great opportunity. In speaking of this wonderful opportunity for American ship-owners, McMaster says:

> In two years, almost the whole carrying trade of Europe was in their hands. The merchant flag of every belligerent save England fell in their hands.

But this mushroom growth of our merchant service did not rest on a secure basis. First, our shipping was attacked by privateers and pirates. Second, our ships were searched by British naval vessels and our seamen impressed. Third, our shipping was seized by each belligerent for entering the ports of its enemies.

At first we had no Navy whatever to resist these attacks on our shipping. Our prosperity due to increased shipping and commerce would have permitted the building up of a powerful fleet. In 1794 Gouverneur Morris, the noted financier, wrote:

> I believe that we could maintain twelve ships-of-the-line, perhaps twenty, with a due proportion of frigates and smaller vessels. And I am tolerably certain that, while the United States of America pursue a just and liberal conduct, with twenty sail-of-the-line at sea, no nation on earth will dare to insult them.

Had our Congress listened to this wise counsel we would soon have built up a sea power which would certainly have had an incalculable effect upon our national development. Finally, upon Washington's recommendation, six frigates were authorized, with the provision that their construction should be stopped as soon as a treaty was made with the Mediterranean pirates. This treaty was arranged at a cost of about $1,000,000 and in January, 1798, the *Crescent* frigate accordingly sailed for Algiers. An old newspaper says:

> The *Crescent* is a present from the United States to the Dey as a compensation for delay in not fulfilling our treaty obligations in proper time. The *Crescent* has many valuable presents for the Dey, and when she sailed was supposed to be worth at least $300,000. Twenty-six barrels of dollars constituted a part of her cargo. It is worthy of remark that the captain, chief of the officers and many of the privates of the *Crescent* frigate have been prisoners at Algiers.

Surely no captain had a sadder duty than to surrender his ship under such disgraceful conditions.

Fortunately seizures of our shipping by French privateers and cruisers caused three of our frigates and some smaller vessels to be completed and these few ships acted so

vigorously that France quickly ordered her vessels to cease their attacks.

Marvin says:

> Perhaps the greatest and most enduring result of the ocean war with France was its demonstration of the intimate relationship of a merchant marine and a fighting navy. But for our spirited resistance France in 1798 would have first destroyed our West India carrying, and then turned her cruisers and privateers loose upon our coastwise trade and our profitable traffic with the ports of Britain and North Europe.

Our Navy next tried to solve the difficult problem presented by the Mediterranean pirates and in a long four-years' war greatly curbed their power. But now Jefferson's pacifism and his opinion as to the "ruinous folly of a navy," reduced our naval forces and, while still adequate against pirates, they were helpless against the might of Great Britain. In fact, they could not even keep their own seamen from being forcibly impressed, much less defend our merchant vessels from this intolerable and insulting procedure. New York was blockaded by two British frigates. One of their midshipmen wrote:

> Every morning at daybreak we set about arresting the progress of all the vessels we saw, firing off guns to the right and left to make every ship that was running in heave to or wait until we had leisure to send a boat on board to see, in our lingo, what she was made of. I have frequently known a dozen and sometimes a couple of dozen ships lying a league or two off the port, losing their fair wind, their tide, and, worse than all, their market for many hours, sometimes the whole day, before our search was completed.

Jefferson's answer to these insults was an embargo which in one year brought our foreign trade from $246,000,000 to $79,000,000. An English traveler from New York wrote:

> The port, indeed, was full of ships but they were dismantled and laid up; their decks were cleared, their hatches fastened down, and scarcely a sailor was to be found on board; the grass had begun to grow upon the wharves.

As soon as matters were partly patched up with Great Britain, Napoleon showed his contempt for our weakness by seizing at one time 134 American vessels and all our cargoes, a loss to our people of over $10,000,000, for which sum we could have built Morris' twenty sail-of-the-line. Now the British renewed their seizures and restrictions, and finally in 1812 after all Jefferson's pacifism, we were driven into the war he so feared. During these years our Navy had been growing weaker and weaker and the war which we ourselves declared found us completely unprepared. A large number of our ships were in no condition for sea and most of them were lacking in personnel. Even the *Constitution* had to ship a new crew of merchant seamen for her first voyage.

Under such conditions it is not surprising that in 1814 our foreign trade dropped to less than one-twelfth its figure for 1807. Our ports were subjected to such a close blockade that even our naval vessels had difficulty in getting to sea and, of course, commerce under such conditions was impossible. Even the coasting trade was ruined. However, war was better than embargo, for our seamen and ships were ideally fitted for privateering, which both inflicted losses on the enemy and at least paid for the upkeep of our vessels and the pay of the seamen, and in many cases brought fortune to venturesome shipowners. Our 500 privateers roamed every sea and took about 1,500 prizes, valued at $39,000,000. The *Grand Turk* made no less than thirty prizes; the *America* took twenty-six and actually brought into American ports property valued at considerably over $1,000,000. These operations, together with the effective cruises of the regular Navy, which forced the British to adopt the costly convoy system, sent up the price of flour in England to $58 a barrel, while even the close British blockade of our ports could not force it above $12 in any part of the United States. The merchants of Glasgow adopted the following resolution:

> That the number of privateers with which our channels have been infested, the audacity with which they have approached our coasts and the success with which their enterprise has been attended, have proved injurious to our commerce, humbling to our pride, and discreditable to the directors of the naval power of the British nation, whose flag, till of late, waved over every sea and triumphed over every rival. That there is reason to believe that in the short space of less than twenty-four months, above 800 vessels have been captured by that power whose maritime strength we have hitherto impolitically held in contempt.

On the other hand it must be recognized that the cream of our seamen was drawn into privateering by the higher pay, and for this reason our naval vessels often found difficulty in completing their crews. On the whole, privateering in 1812-15 had a very favorable effect and, due to our lack of a powerful navy, was probably our most deadly weapon.

W. L. Marvin in the following table shows the rise and fall of our foreign commerce and shipping from 1789 to 1814:

Year	*Tonnage of Shipping*	*Foreign Commerce*	*Per cent of Commerce Carried in Our Ships*	
			Imports	*Exports*
1789	123,893		17.5	30.0
1792	411,438	$ 52,253,098	67.0	61.0
1795	529,471	117,746,140	92.0	88.0
1798	603,376	129,879,111	91.0	87.0
1801	630,558	204,384,024	91.0	87.0
1804	660,514	162,699,074	91.0	86.0
1807	810,163	246,834,150	94.0	90.0
1810	981,019	152,157,970	93.0	90.0
1812	758,636	115,557,236	85.0	80.0
1814	674,633	19,892,441	77.0	71.0

After the war our merchant marine again had a rapid growth. Our commerce increased with the development of our country and the growth of our shipping. Fortunately there were no great wars for a long period and our Navy was maintained in a condition adequate for protecting our shipping against pirates. David Porter virtually cleared the West Indies of these pests in the early 1820's. Our whalers covered every sea, so that in 1842 we owned 652 out of the 882 whaling vessels of the world. Our ships were rapidly driving the British from the seas. In 1827 the London *Times* said:

> Twelve years of peace, and what is the situation of Great Britain? The shipping interest, the cradle of our navy, is half ruined. Our commercial monopoly exists no longer; and thousands of our manufacturers are starving, or seeking redemption in foreign lands.

The reason for this was that Americans could both build and operate ships cheaper than the British. In 1836 our foreign commerce reached a value of over $300,000,000. An unusual example of Yankee ingenuity was the shipping of ice on a large scale from Boston to Havana and New Orleans; a few cargoes were carried even to Calcutta. Another was the passage of the steamer *Savannah* across the Atlantic in 1819, a feat not duplicated for nineteen years. In 1816 we established the first line of sailing packets from New York to Liverpool which sailed on a prearranged schedule. One vessel of this line served for twenty-nine years and made 116 round trips to Europe without, it is said, losing a seaman, a sail, or a spar.

Our warehouses held the products of the globe. Marvin writes:

> Very interesting and odorous places were those old Salem warehouses, where under one roof would be gathered the characteristic products of the four corners of the world. Hemp from Luzon, pepper from Sumatra, coffee from Arabia, palm oil from the west coast of Africa, cotton from Bombay, duck and iron from the Baltic, tallow from Madagascar, salt from Cadiz, wine from Portugal and the Madeiras, figs, raisins, and almonds from the Mediterranean, teas and silks from China, sugar, rum, and molasses from the West Indies, ivory and gum-copal from Zanzibar, rubber, hides, and wool from South America, whale oil from the Arctic and Antarctic, and sperm from the South Seas. It is probable that no equal population, on a narrow mile of shore anywhere, conducted such a wonderfully varied commerce.

British merchants, seeing that they could not compete with us in sailing ships, turned as a last resort to the steamer; if steam were to supplant sail, their superior facilities for working steel and iron would give them an advantage in construction and operation. In 1839 the British government granted a subsidy of $425,000 to the Cunard Company to establish a trans-Atlantic steamer service and later this subsidy was increased to $850,000. This gave the British an advantage in quick service until 1845, when, as a result of subsidies by our government, we commenced competing with them in steamer service across the Atlantic.

In 1850 the great Collins line of steamers was established under liberal subsidies and soon wrested supremacy from its British competitors, and brought our total steamer tonnage to an equality with that of Great Britain. The California gold rush in 1849 greatly increased the demand for sailing vessels to be used for the long voyage round the Horn and the beautiful clipper ship was the result. The Crimean War of 1854 increased the demand for clipper ships, which the French and British used for troop transport; in 1855 we built 507 sailing vessels for our foreign trade. The clipper ships also became famous in the China trade; the *Nanchez* made the voyage from Canton to New York in the record time of seventy-six days.

Again, however, our merchant marine was to feel the effects of war. As early as 1856 its death-knell was sounded. The South saw that in the approaching conflict the steamers which plied from Northern ports would be used to their disadvantage and the subsidy was reduced. This, coupled with two maritime disasters, threw the Collins line into bankruptcy. British subsidies had won the day. The Civil War gave them the chance to deliver the *coup-de-grace*. The *Florida* and *Alabama* were fitted out in British ports to prey upon our commerce. Our Navy

was not powerful enough to threaten retaliation for this unfriendly conduct nor was it sufficient to protect our shipping against the depredations of these swift cruisers. The *Florida* took fourteen prizes on her first cruise, the *Shenandoah* thirty-eight. The *Alabama* literally swept our shipping from the seas. In all, Confederate cruisers destroyed 110,000 tons of our shipping. But this was not the worst. The moral effects were, as usual, greater than the actual results. During the war we sold 750,000 tons of shipping to foreign owners. In 1861 our ocean fleet was 2,496,894 tons; by 1866 it was 1,387,756. Great Britain paid $15,500,000 for her unneutral conduct. It was the best investment this sagacious country ever made. The ruin of our merchant marine would have been a bargain at ten times the price.

While our Navy was thus powerless to save the merchant marine from Confederate cruisers, the merchant marine was furnishing the Navy with half its ships, four-fifths of its officers and five-sixths of its men.

The following data, furnished by Marvin, traces the course of our merchant marine during the eventful years from 1815 to 1865:

Year	*Tonnage of Shipping*	*Foreign Commerce*	*Per cent of Commerce Carried in Our Ships*	
			Imports	*Exports*
1815	854,295	$165,599,027	77	71
1820	583,657	144,141,669	90	89
1825	665,409	180,927,643	95	89
1830	537,563	134,391,691	94	86
1835	788,173	251,980,097	90	77
1840	762,838	221,927,638	87	80
1845	904,476	219,224,433	87	76
1850	1,439,694	317,885,252	78	65
1855	2,348,358	476,718,211	77	74
1860	2,379,396	687,192,176	63	70
1865	1,518,350	404,774,883	30	26

After the war the merchant shipping situation grew worse and worse. In the transition from sail to steam and from wood to iron and steel, our builders fell far behind. In 1870, 82 per cent of the vessels building in Great Britain were of iron, as against 8 per cent in the United States. The conquest of the West, with its attendant increase in our natural resources, turned for a time our tide of development across the continent rather than across the seas. Our merchant marine decreased so rapidly that in 1898 practically no merchant ships were available to transport our troops to Cuba; in 1900 only 9 per cent of our foreign commerce was carried in American bottoms. The building up of our coasting and Great Lakes shipping, which was protected by law from foreign competition, to a slight extent counterbalanced the disappearance of our flag from distant seas.

Meanwhile, the Spanish-American War had proved the utility of a navy and when finally we were drawn into the World War, our situation was just the reverse from those which existed in 1812 and 1861, for now we had a navy without a merchant marine.

The German submarine campaign had so decreased Allied merchant shipping that defeat was threatened. The extent to which we could use our Army and Navy in Europe depended upon the number of merchant vessels which could be used for their transport and maintenance. In December, 1917, Lloyd George said:

> Victory is now a question of tonnage, and tonnage is victory. Nothing else can defeat us now but shortage of tonnage.

At last we perceived the value of the merchant marine as an essential instrument of war. Our first problem was to build one.

But a merchant marine could not be built overnight. First, we had practically no shipyards. Second, we had very few people who even knew anything about building ships. Third, we lacked the materials for ship construction. Fourth, we had neither officers nor crews to operate the ships once they were constructed.

Numerous shipbuilding plants were built along both our sea frontiers. Workmen were recruited and trained; new cities sprang up to house them. As steel was all-important for every kind of war munitions, we built many vessels of wood and concrete because these materials were more available. The Navy, instead of being assisted by the merchant marine to obtain the officers and men necessary for its war expansion, now had to train the personnel for the expanding merchant marine and to operate its vessels. This we could do only because the Grand Fleet held in port the German surface craft, thus allowing the greater part of our battle fleet to be used as a gigantic training squadron to provide the men for our merchant shipping and destroyers. The expansion of our merchant shipping was a terribly costly and tedious procedure.

Fortunately, two unusually lucky circumstances favored us. First, there was a great fleet of German vessels in our ports and,

while their crews made some efforts to wreck their machinery, the Navy quickly effected repairs and put the ships in operation. Second, exercising the right of angary we "took over" a large number of Dutch vessels which, due to the submarine warfare, were lying inactive in our ports.

Our emergency fleet cost us the stupendous sum of $3,500,000,000. It served its purpose in the war and, while mistakes were made, they were less than might have been expected when one considers how completely unprepared we were to build or operate merchant shipping.

After the war we seemed well established as a sea power. Mr. A. H. Haag says:

> Many believed that the United States would at last take her place as a maritime nation now that she had this huge fleet of ships. However, only a small percentage of the vessels constructed during the emergency were suitable for competitive purposes in the world's trade routes.

The wood, composite and concrete ships soon deteriorated and even the steel ships, built in great haste in standardized classes, were little adapted to peacetime needs. All were very slow. Of vessels of twelve knots or over we have but 234 to 1,280 for Great Britain. Mr. Haag says:

> The gradual trend in the last decade has been toward cargo liner service and today this service constitutes 75 per cent of the world's shipping. Other nations, realizing this change, lost no time after the end of hostilities in constructing and acquiring suitable types for this service, while we pondered as to how our emergency ships could best be employed.

During the five-year period from 1922 to 1926 the following ocean-going ships over 2,000 tons have been built:

Country	*No. Vessels*	*Aggregate Gross Tonnage*
United States	14	136,884
Great Britain	599	3,607,967
Japan	52	250,856
France	72	448,739
Italy	63	505,845
Germany	172	954,447

In 1927 we have built or contracted for four ships, while for Germany the figure is forty-nine and for Great Britain 142.

Just as the change from sail to steam had disastrous effects for our merchant marine, now the change from steam to Diesel propulsion is leaving the United States far in the rear, for 48 per cent of the vessels recently constructed have Diesel engines. However, we still are much ahead of our prewar situation; and the Shipping Board through government subsidy has kept in operation many important lines and services. Our coastwise and lake shipping is excellent. Our tanker fleet is well built and efficiently operated.

Just as we feverishly built up a great merchant marine regardless of cost for temporary war use, so during the great emergency did we build great numbers of submarine chasers, eagleboats, and aircraft of no permanent value to the Navy. While the destroyers built were valuable, the great numbers gave us a surplus in this type which might much better have been applied to cruisers. Work on our great program of battleships and battle cruisers was subordinated to the completion of small craft when, after the war, this program again was actually pushed, we saw practically all these invaluable new ships scrapped in accordance with the Washington agreements. We did obtain, however, a theoretical equality with Great Britain in naval power and it is hoped that we may eventually turn this into an actual equality.

The cessation of shipbuilding after 1921 has now virtually ruined our shipbuilding industry and this creates a very serious situation for both the Navy and the merchant marine. This now is the weakest link in the chain of our sea power. Our cruiser contracts are just keeping alive three of the largest companies. They came too late to save the famous firm of William Cramp and Sons, which has built so many splendid ships for the Navy.

The cost of carrying our foreign commerce is now $600,000,000. It is incomprehensible that we would let foreign countries control our railroads and allow us to use them only on their terms. However, merchant shipping is only the extension of our railroads over the high seas to other countries. It is undoubtedly fair that the control of this shipping should be equally divided between two countries thus connected. It is vitally essential that we should transport half our exports and imports in our own bottoms, for only so can we insure fairness in commercial competition and be assured of marketing our exports and obtaining our vital imports.

Today we export nearly $5,000,000,000 worth of American goods annually. It is estimated that an average of 60,000 men in

every state are engaged in the production of this surplus for export. If there is a breakdown in oversea transportation, these men will suffer and the industries in which they are employed be ruined. Only twenty-seven per cent of our exports are carried in American vessels.

The only way in which we may be insured against interruptions in transportation is to have under the American flag sufficient bottoms to carry at least one-half our exports and imports. This will provide for ordinary needs and allow for a possible change of routes to cover emergencies. At the beginning of the World War we carried only about ten per cent of our oversea trade under our flag. German shipping was driven from the seas, and a great part of the British merchant marine was used for the transportation of troops and service as auxiliary cruisers. Thus our foreign trade was deprived of most of its carriers and suffered great losses. "It is a conservative estimate in my judgment," said Senator James, "that our lack of shipping at the beginning of the World War has cost our people more than $7,500,000,000." Over half our Army was carried to Europe by British vessels. While this was a confession of weakness from a military viewpoint it also cost us heavily financially and gave this business to English shipping companies for good profits.

In 1922 our coal strike created shortages of fuel along the Atlantic coast. Foreign vessels appeared to have our industries in their power and increased their rates for the transportation of coal from England. The Shipping Board then declared its willingness to transport all this fuel at reasonable rates. Although our ships carried only one-third of the amount imported, its competition forced down the rates charged by foreign vessels and thus effected a great saving for the entire country.

In the fall of 1924 an unusually big wheat crop provided 50,000,000 bushels more than could be used in this country. This threatened to force down the price to an amount which would have ruined many wheat growers. The Shipping Board supplied vessels to export the surplus wheat and saved the situation. Again, when the British coal strike compelled foreign vessels to be diverted from their usual routes to bring fuel to England—a real example of "carrying coals to Newcastle"—the Shipping Board provided the necessary vessels to export our cotton and wheat.

The expansion of our merchant marine is necessary also for national defense. In these days the combatant ships of the Navy are absolutely dependent upon vessels of the merchant types for their supply and repair. If a fleet is to leave its home bases it must have oilers to carry its fuel; refrigerator ships for fresh meat; distilling ships for fresh water; cargo ships for general stores; and repair ships and tenders for making emergency repairs. To carry the accompanying expeditionary forces of troops and marines large fast passenger vessels must be converted into transports. Fast vessels of medium size must be used for carrying and laying the mines which have become such an important factor in naval warfare. Large combined passenger cargo vessels are required to carry seaplanes and their operating crews. These vessels correspond to the railroads and motor trucks required to maintain an army in the field and are just as essential. The Navy cannot afford to keep all these non-combatant ships in commission in peacetime and must rely upon the merchant marine to have them available for transfer into the Navy when the emergency arises. The officers and crews of the merchant vessels designated for such transfer should be members of the naval reserve so that when the ships are commissioned by the Navy they will already be manned by crews familiar with their peacetime operation and trained during peacetime for their new naval duties. The limitation of navies by international agreement makes it particularly important that we receive support from our merchant shipping equal to that which the British Navy may receive from its merchant marine.

The Constitution Campaign *and its* Progress

By Rear Admiral Philip Andrews, *U. S. Navy*

Chairman, National Committee to Save Old Ironsides Fund

THE *Constitution* is our greatest naval memorial, and certainly equal in historical value to the few other great memorials which this nation possesses. England has saved Nelson's flagship *Victory* by popular subscription. She has been rebuilt and will be preserved for all time. So also must the *Constitution* be preserved.

The *Victory* has been placed on a permanent foundation and cannot move. Visitors must go to her. As Great Britain is not large this is not so difficult.

But our *Constitution* is not to be so repaired and fixed in one spot.

The Act of Congress authorizing the Secretary of the Navy to accept donations to pay for her rebuilding, provided that she was to be restored to her original condition as nearly as practicable. This means that with a proper crew she could sail anywhere in any weather, and would be entirely a serviceable and seaworthy ship. She will be fitted with all rigging and sails, her furniture and equipment, one old-fashioned anchor and hempen cable, her old whale-oil lamps, and such warlike articles as her old-type guns, boarding pikes and cutlasses.

Though the *Constitution* could go anywhere under her own power, this will not be attempted. The Secretary of the Navy has announced that she will be towed all over the country to Atlantic, Pacific and Gulf coasts; up the rivers as far as practicable, and to the Great Lakes when the navigation conditions permit. Thus it will be possible for great numbers of grown people and children to see this relic of old times, to realize her history and battles and feel the inspiration of her presence. To them she will represent sea power, the protection of merchant vessels and commerce, the establishment of freedom on the sea.

When the *Constitution* is finished, a naval museum of souvenirs and relics will be established on board in her cabins and covered decks—pictures of her captains, books, original papers and documents, swords and other articles used on the *Constitution* or once in possession of people who served on her. Many such articles have been given and more are promised. Thus the old ship will be in itself a floating museum of naval history and tradition.

Up to the time of the Civil War, the *Constitution* was the only ship of much note in our Navy. Then we had the *Monitor,* of the *Monitor* and *Merrimac* fight, the ship from which sprang the battleship; the *Hartford,* Admiral Farragut's flagship at Mobile Bay and the Mississippi fights; the *Olympia* of Dewey and Manila bay; and many other ships of many good and even great deeds. But of them all the old frigate *Constitution* stands out alone, unique in her many victories and their effect on our final independence and early struggles. She was the earliest example we had of effective sea power, illustrating in her single self the protection of a merchant marine and its freedom to sail the seas, and the maintenance of the rights of a free nation.

In the campaign against the Barbary States, under Commodore Preble, and with a small number of other vessels in Preble's squadron, she broke the power of the Barbary pirates and established the principle that our merchant vessels could trade on any sea without paying tribute to any power. Up to that time for centuries, the countries of Europe had paid tribute to the heads of the Barbary States.

Some nations, by paying well and by furnishing arms and ammunition to the pirates in the Mediterranean, secured special advantage to their own commerce.

When after the Revolution, American commerce and ships became numerous, these favored nations were thus able to harass and hinder our trade. Our ships paid tribute and even then American ships were captured

and their crews thrown into prison. Preble's campaign put an end to all this, and our ships paid tribute no more, and our seamen were released.

For twenty years up to the War of 1812, the British and the French hindered the trade of our ships and captured them, took seamen from these ships, and used our harbors because we had no adequate Navy to maintain American rights.

The *Constitution* captured French privateers and in the War of 1812, in her victorious battles with the British men-of-war, established the principle of the freedom of the seas and made the Declaration of Independence a final and established fact. She is thus our great exponent of sea power and what it means to our merchant marine. She is our great example of what sea power means in establishing and maintaining the rights of an independent nation.

So the American nation owes this old ship a debt of gratitude for what she accomplished, and what she taught this country of the necessity of sea power. This means a balanced navy sufficient to maintain the rights and privileges of the nation, of whatever types and numbers necessary for this great purpose.

The *Constitution* was put in the old dry dock at Boston on June 16 last, and reconstruction work commenced. About half the amount of money necessary to complete her has been received. The balance necessary should come from donations, and the sale of the *Constitution* picture, of which about 1,000,000 have so far been distributed. The picture is sold for twenty-five cents, too small a sum for it; but the reason for this is to reach as many as possible, particularly the children, with the story of the *Constitution* and the great principles for which she fought. With each picture goes a small amount of information which visualizes the early struggles of this country, the way in which independence was partially achieved, and finally successfully consummated in the War of 1812. The greatest number of pictures have been sold in department stores. They have been generously taken by many banks, insurance companies and industrial concerns. Newspapers and radio stations have given much publicity to the picture.

Curiously enough patriotic societies, and the big organizations which seek to lead the young into the paths of good citizenship have done little. These organizations have rules which have prevented full coöperation so far. When the campaign started among the school children, similar rigid rules were met; but in the larger cities of the country these rules were suspended because of the unusual patriotic value of the campaign. But only after much opposition, and much explanation of the historical value to the children of the *Constitution* campaign.

So too it is still necessary to demonstrate to the big organizations who deal with youth in this country that the purpose of the campaign is educational, and exactly the same as the basic principles on which these organizations depend, and for which they were founded. It is difficult to get the help of these organizations for they are often solicited to assist many worthy causes, and they must resist in most cases.

They are, however, slowly realizing the unusual patriotic value of this campaign and will no doubt assist when they fully understand. It is necessary also for them, and for the patriotic citizens too, to realize that the lessons of the early history of this country, and the demonstration of the value of sea power by the achievements of the *Constitution,* are lessons in good citizenship, of great spiritual value. And these lessons furnish an effective antidote to radical subversive doctrines in schools and among the people. Such an educational campaign, therefore, deserves the support of good citizens everywhere. And where the people are effectively reached, they give such support.

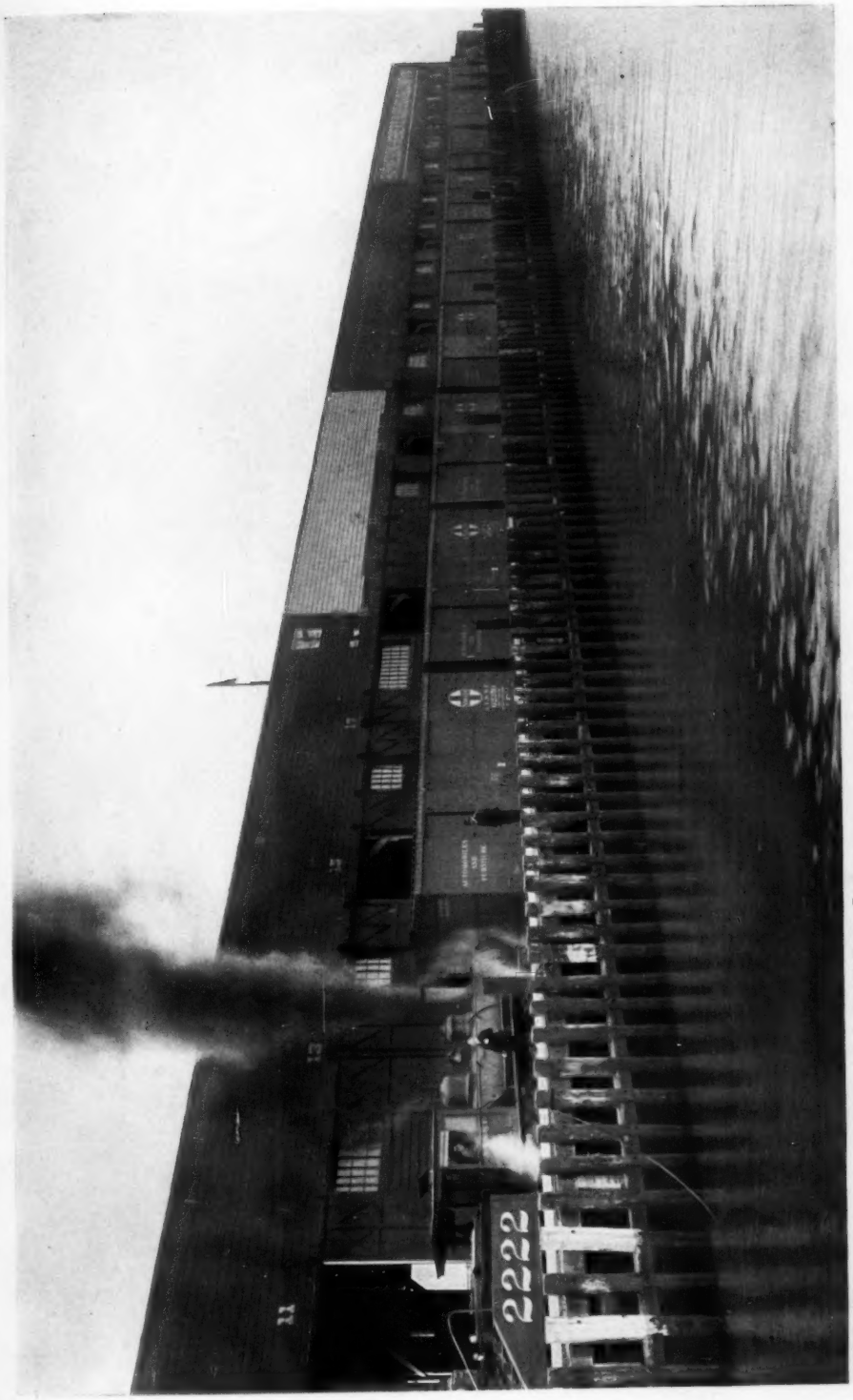
The money to rebuild the *Constitution* should come only from the great mass of our people who are willing to help, and not from an appropriation by Congress.

The Navy, Marine Corps and Coast Guard have done much to help. Their interest, and that of citizens and big civilian organizations is still needed to promote the sale of the *Constitution* picture.

The *Constitution* is now being broken up, and much money should be realized by the sale of souvenir pieces of wood and metal as authorized by Congress.

Yacht and other clubs and organizations can obtain large pieces of wood, such as knees and other large pieces in exchange for substantial donations.

The *Constitution* campaign is very much alive but needs continued and active support. The *Constitution* saved the nation in its early days! Now let the people save her as a permanent Memorial of Patriotism!



Courtesy of the Atchison, Topeka and Santa Fe Railway System

A Train Load of Freight at the Piers at San Francisco

Courtesy of the Atchison, Topeka and Santa Fe Railway System

UNLOADING SUGAR FROM THE STEAMER "ALASKAN" AT THE SANTA FE PIER, SAN FRANCISCO

Courtesy of the Atchison, Topeka and Santa Fe Railway System

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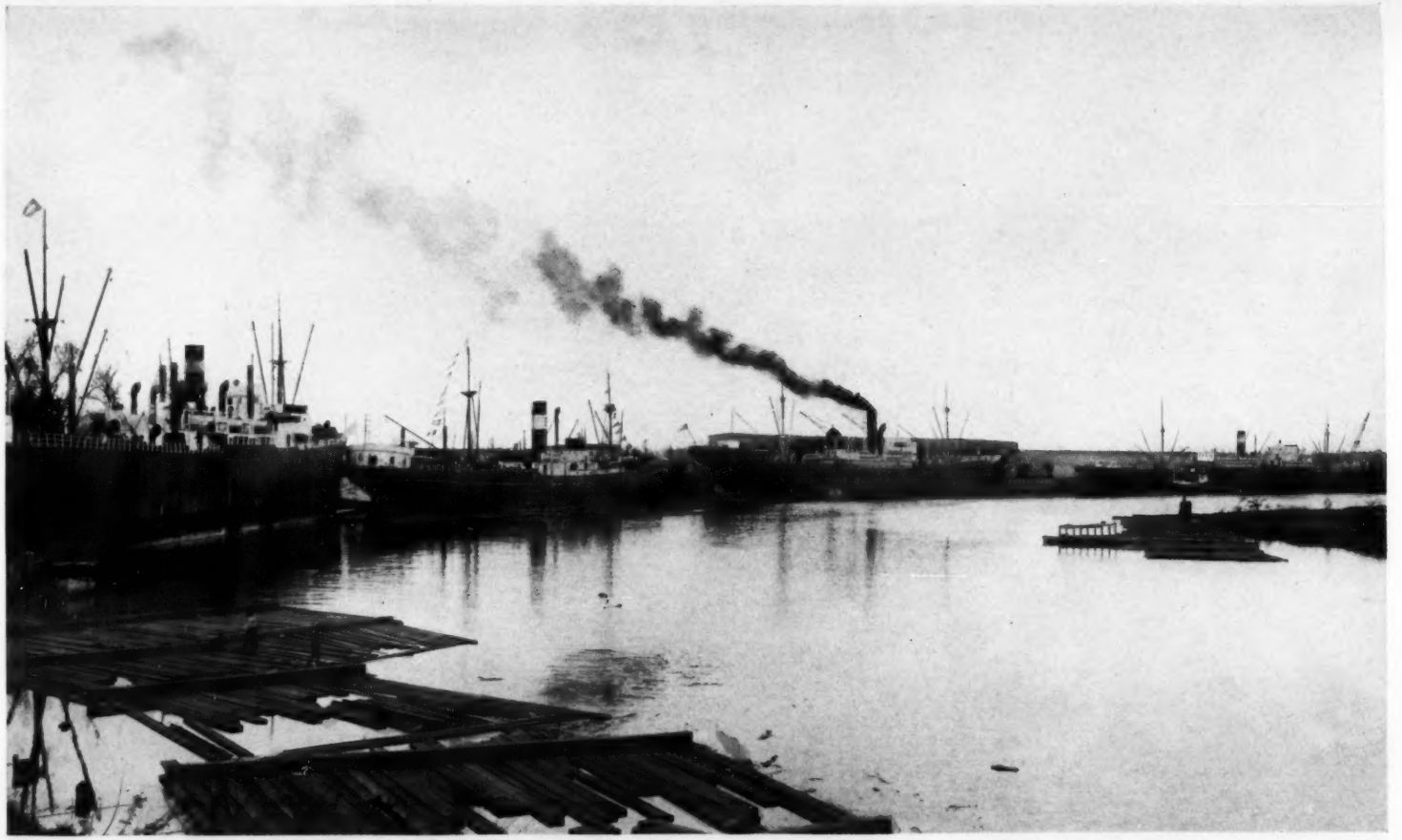
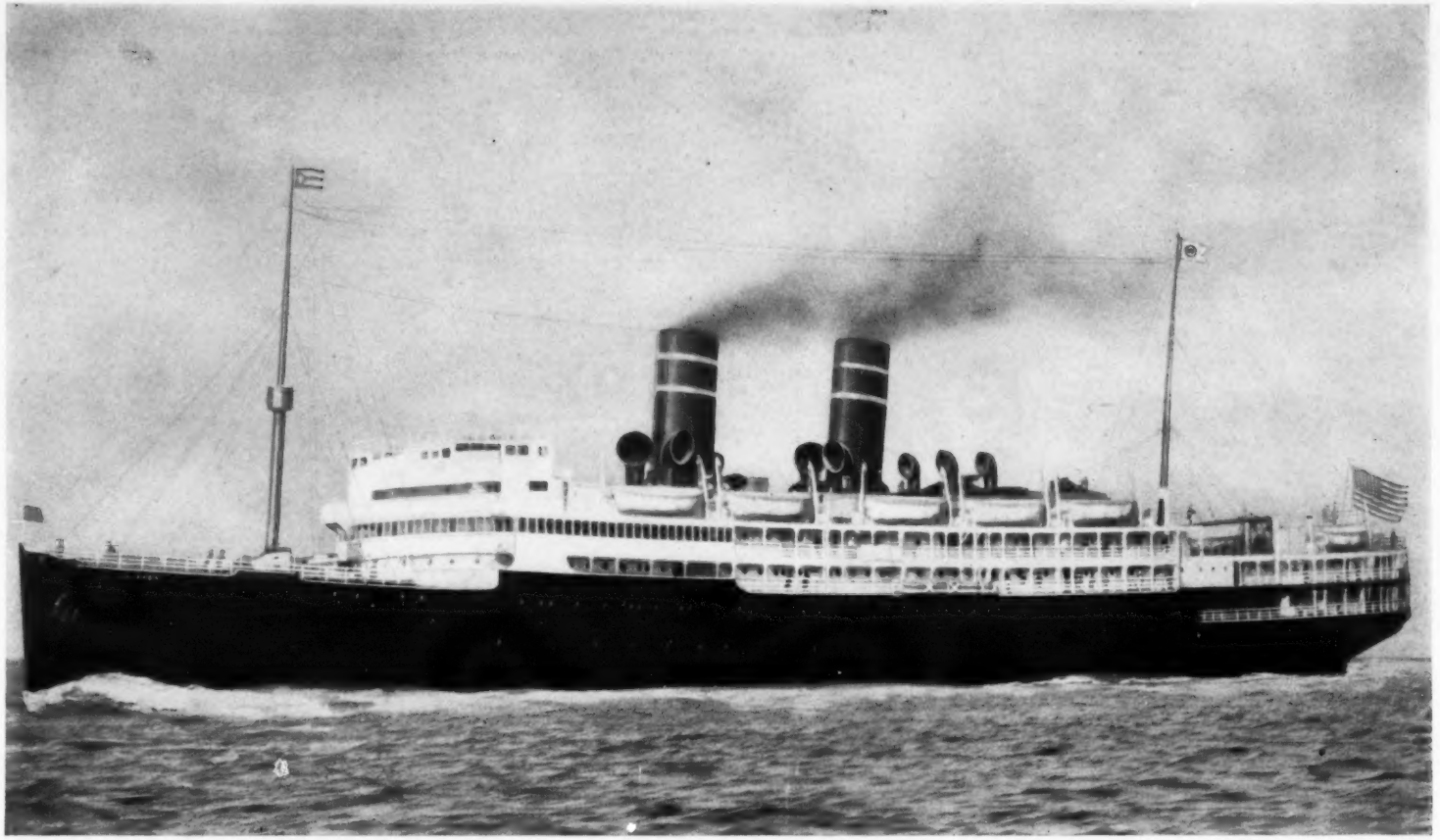


Courtesy of the Atchison, Topeka and Santa Fe Railway System

SHIPS TAKING ON CARGO FOR EXPORT IN THE TURNING BASIN, BEAUMONT HARBOR



Courtesy New York and Cuba Mail Steamship Company

THE WARD LINER "ORIZABA," SISTER SHIP OF THE "SIBONEY"

These ships are passenger and cargo steamers operating in the New York-Havana Express Service, weekly sailings in each direction. This Company also has a fortnightly service from New York to Havana and to Progresso, Vera Cruz and Tampico, Mexico, with the steamers *Mexico* and *Monterey*.

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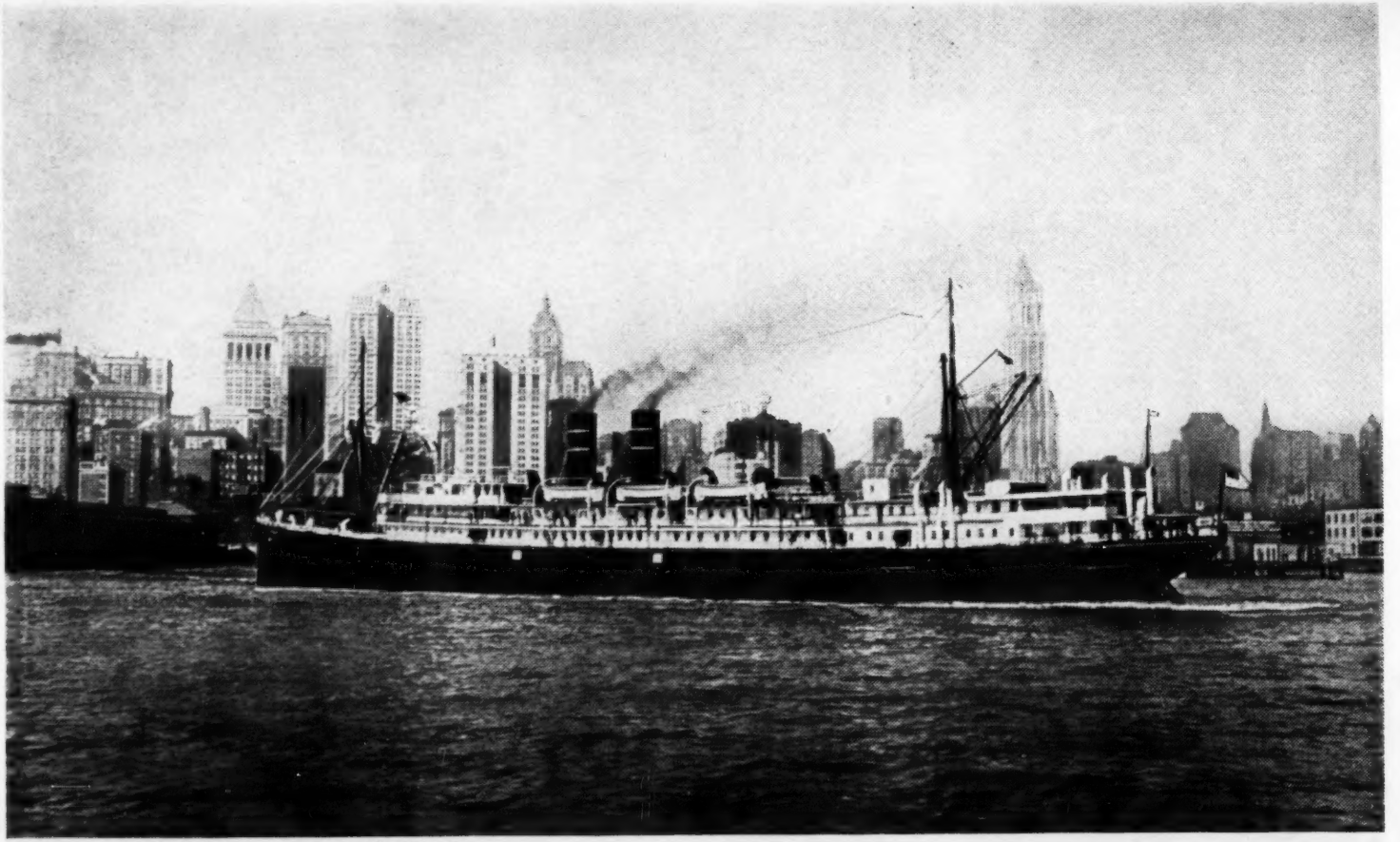
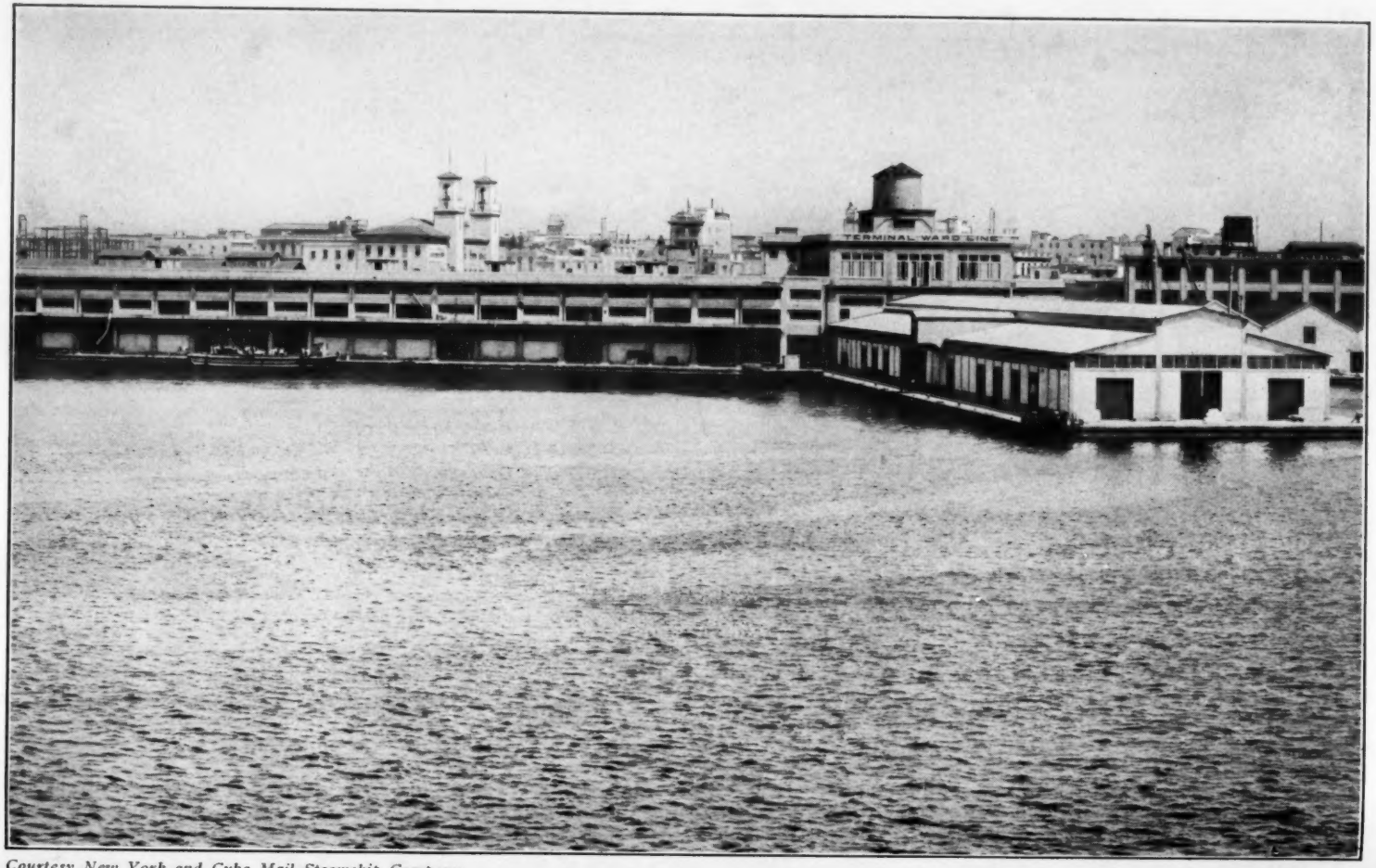


Courtesy New York and Cuba Mail Steamship Company

WARD LINE S.S. "MEXICO"

Popular passenger steamer operated by Ward Line in the New York-Cuba-Mexican Gulf Service.



Courtesy New York and Cuba Mail Steamship Company

WARD LINE TERMINAL, HAVANA, CUBA

Completed in 1925. Largest and most up-to-date terminal of any in the West Indies.

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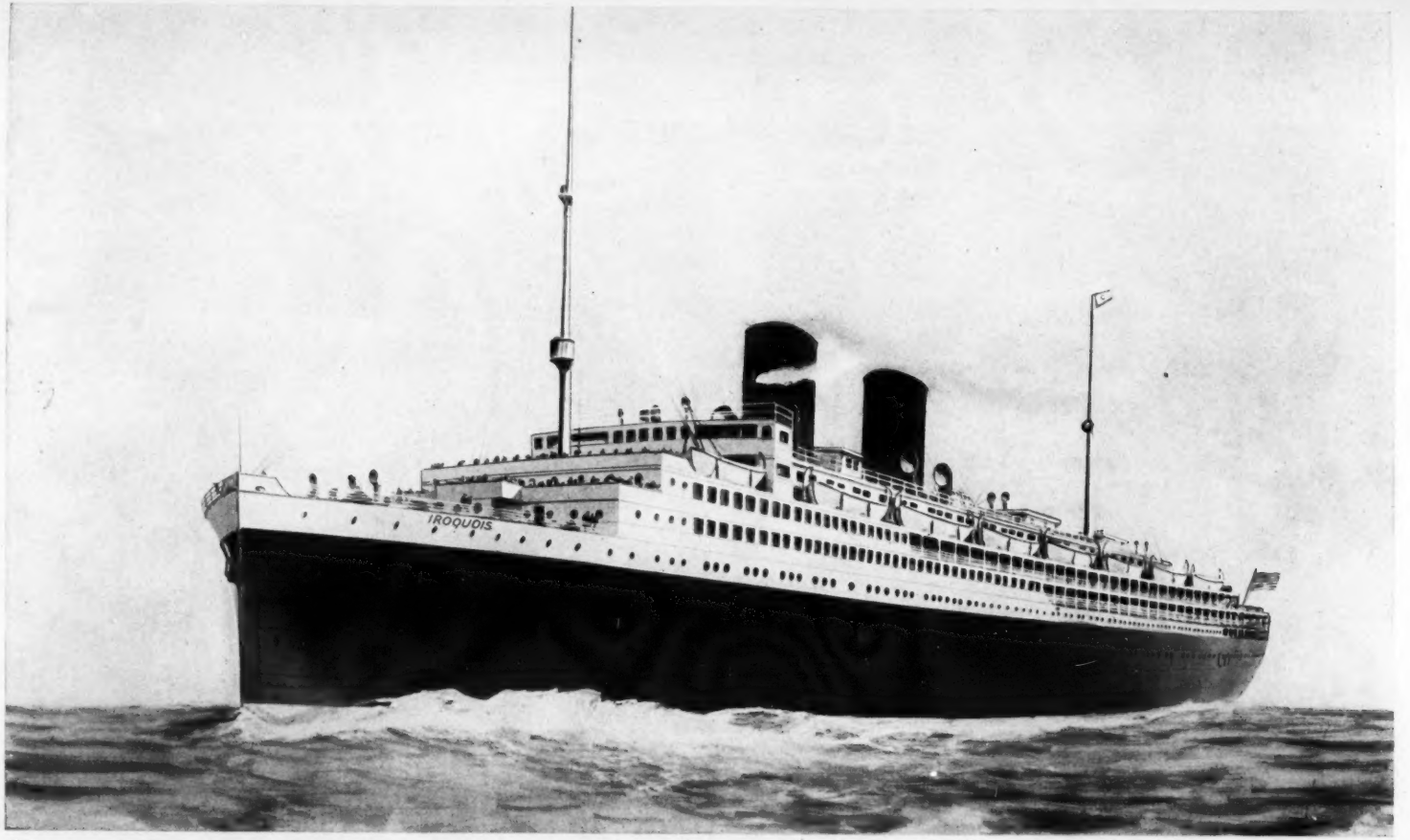
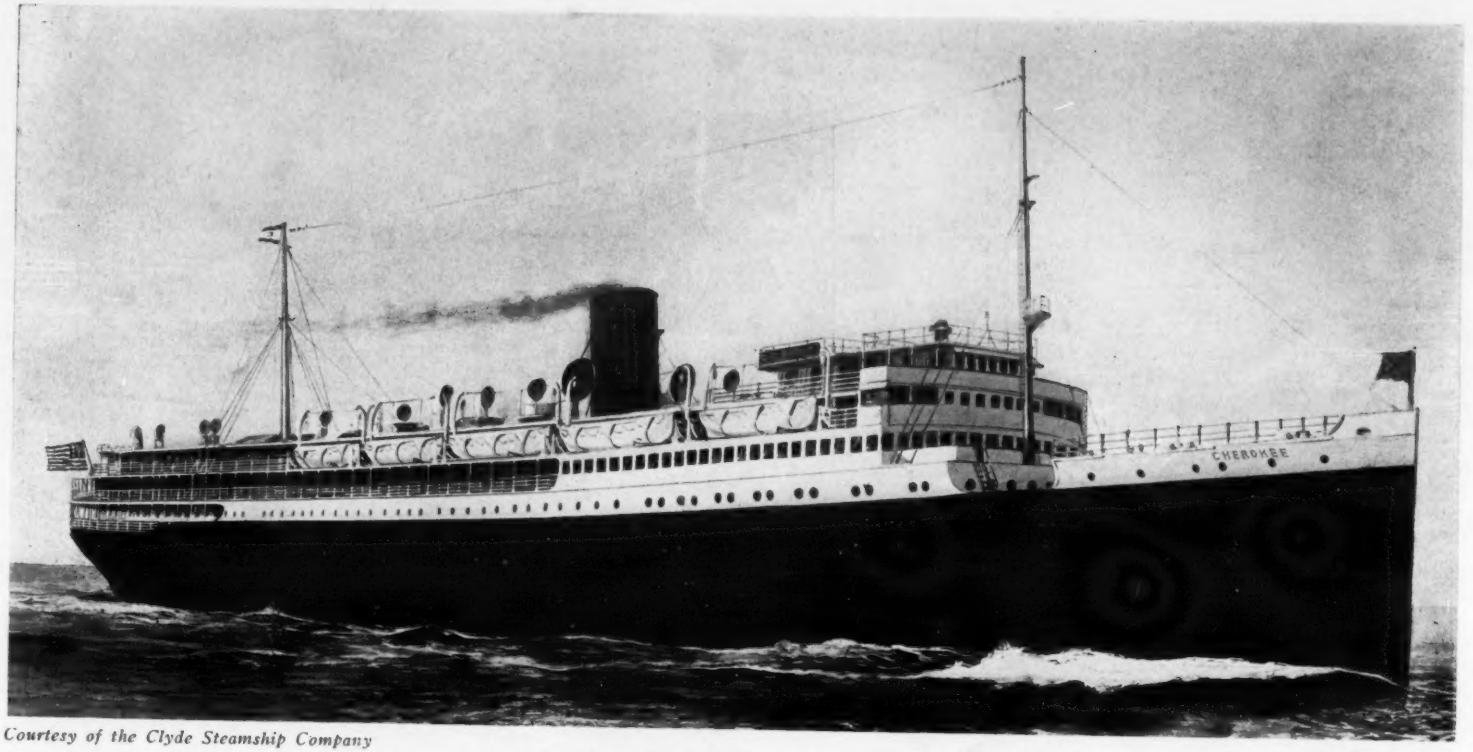


Courtesy of the Clyde Steamship Company

S.S. "IROQUOIS," CLYDE LINE, NEW YORK
Sister ship to the S.S. *Shawnee*.



Courtesy of the Clyde Steamship Company

S.S. "CHEROKEE" OF THE CLYDE LINE, NEW YORK
Sister ship to the S.S. *Alonquin, Mohawk* and *Seminole.*

DISCUSSION

A Destroyer Leader for the U. S. Fleet

(See page 325, March, 1927, PROCEEDINGS and page 685, June, 1927, PROCEEDINGS)

CAPTAIN J. K. TAUSSIG, *U. S. Navy.*—In the March issue of the PROCEEDINGS, Mr. Prendergast submitted a design for a destroyer leader with very able arguments in support of it. It was my intention immediately to comment on this most interesting paper, but ship duties prevented. In the June issue of the PROCEEDINGS there are published discussions on the Prendergast design by Dr. Mendl and by Mr. Brockholst Livingston. As these discussions refer to the design submitted by the writer in the June, 1926, number of the PROCEEDINGS, it would seem that comments on my part may not be out of place.

Mr. Livingston states that he considers me "one of the most radical of our officers," thereby implying (so I suppose) that the design of my destroyer leader is too radical. Yet he also states in his discussion that he agrees with Mr. Prendergast's statement that: "What is wanted is neither a trimmed down cruiser nor an inflated destroyer, but an entirely new type of vessel, expressly and especially designed to exercise the function of sea leadership in the highest sense." This statement certainly is more radical than anything expressed in my design. It does not agree with my much more conservative idea of the leader. After serving on destroyers and on light cruisers, and with five years' experience on the game board at the Naval War College, I come to the conclusion that our destroyer leader really should be in one sense, "a trimmed down cruiser," and in another sense, "an inflated destroyer." In other words, it should combine as far as possible in a vessel of approximately 3,000 tons displacement, the best military and seagoing qualities of both of these types.

The hull designs of our destroyers and light cruisers are wonderfully good. They result in excellent sea boats and in excellent gun platforms. There is no good reason that I can see for giving the destroyer leader a different hull design, insofar as the proportions of length, beam, and draft are concerned. And our flush deck should certainly be a feature of any leader we may adopt.

Much has been written in the discussions on the destroyer leader about smoke interference with ship control and signaling. This seems a bugaboo to many critics. Practical experience on our destroyers and light cruisers, under varied conditions, has shown this imaginary smoke interference not to exist. In fact our American designs with respect to the placing of boiler rooms has permitted a deck arrangement of smoke stacks that does not inconvenience either ship control or signal control. I therefore can see no good reason for making the radical changes in masts and other deck arrangements which are involved in Mr. Prendergast's design.

In all warship designs, one of the essentials is to get rid of as much top hamper as possible. The first impression one gets on looking at Mr. Prendergast's leader is that it contains an excessive amount of top hamper. All of this, of course, detracts from its military efficiency. It would seem doubtful if all of the guns, torpedo tubes, catapults, and the control tower could be placed as shown in the design, and the ship have sufficient stability to make it a good sea boat or a good gun platform. While there is no scale submitted with Mr. Prendergast's design, it looks as if all the things could not be crowded on a vessel approximately 400 feet long and 40 feet beam, but would require a much larger ship.

My conception of the meaning of the word "leader," as used in the name of the

type of ship, is a much broader one than that used by Mr. Prendergast. He apparently uses it in the limited sense of "that which precedes," while my idea as to its meaning is, "that which directs or commands." It is this limited meaning used by Mr. Prendergast which undoubtedly had him place all of his main battery guns in one basket in the forward end of the ship, leaving no astern fire. No one appreciates more the necessity for the spirit of the offensive than I; but it is difficult to conceive of any officer who may actually be called on to fight these destroyer leaders, being willing to subscribe to Mr. Prendergast's gun arrangement. No matter how distasteful the idea of a retreat may be, practically all great military leaders, and some naval leaders, have had to retreat (or withdraw) at one time or another. And the use of stern fire does not necessarily mean that it will be used only in retreat. A few maneuvers on the game board will show that in order to gain advantageous attack positions, it may often be necessary to have the vessel's stern towards some units of the enemy fleet.

Nor do I believe the mounting of the three 5.5-inch guns as shown in Mr. Prendergast's design is suitable for obtaining an adequate ammunition supply without excessive weights, nor for obtaining accuracy of fire under most conditions of weather with the ship steaming at high speed. I believe one pair of six-inch guns mounted in a turret would, under practically all fighting conditions, deliver a much more effective fire than the three 5.5-inch guns as mounted in Mr. Prendergast's design.

The position of the forward torpedo tubes would not permit of the torpedoes being fired on the weather side when the ship is running at high speed in any sea other than a smooth one. Nor could the compartments in which the tubes are installed be kept habitable at sea. That is, unless there is some more effective way for making such port shutters watertight than has been developed in our Navy.

Mr. Prendergast's discarding of the depth charges is shown by his arguments to be based on the thought that his leader must always "precede." He does not even contemplate that sometime the leader might be operating singly. It is my firm conviction that in the next war every vessel which can do so without detracting from some more essential military characteristic will carry depth charges, and that the destroyer leader would be incomplete without them.

My answer to Mr. Prendergast's question as to his design, "Is she a worth-while ship?" is that many of the features involved, while theoretically all right, are not suitable for obtaining the best results practically in a vessel that must fight the enemy from any direction and under various conditions of sea and weather. This because (*a*) she is too complicated in top hamper, (*b*) she will not be a good sea boat nor a steady gun platform, (*c*) her guns are not adequate in number and caliber, nor are they suitably arranged for effective all-round fire, (*d*) she has not the means for proper offense against submarines.

Mr. Livingston apparently agrees with me in that Mr. Prendergast's design is too complicated and that the gun arrangement is not good. My impression is that Mr. Livingston's chief objection to the design originally submitted by me was in the six-inch guns and their installation in two turrets. He asks the question, "Since the leader must meet the same type as the destroyers she leads, should she not mount the same guns as the latter?" I cannot see why this should be so. I believe every type of ship should carry guns of as large a caliber as the limitations of armament treaty permits, or, where the treaty does not apply, as large as the size and sea going qualities of the vessel permit. Cruisers will often be fighting side by side with destroyers, and this is no reason for limiting the size of their guns. The gun is an offensive weapon. The damage it can do increases enormously with each small increase of caliber. The ability of a destroyer leader to continue to lead in an action may depend on the amount of damage it can inflict on an enemy cruiser. It should therefore carry as large a gun as practicable, irrespective of the caliber of guns on the destroyers.

The Defense Against Propaganda

(See page 534, May, 1927, Proceedings)

K. L. Buell.—In my article on "Propaganda" in the May Proceedings, I spoke of the necessity for using propaganda methods in an attempt to stem the tide of foreign propaganda which now threatens to inundate our native institutions and to replace them with other forms of govern-

ment, other modes of thought, or, at the very least, to weaken us as a nation in the face of an armed world.

I am in receipt of a letter from Dr. Alfred C. Lane, Pearson professor of geology and mineralogy at Tufts College, who points out that there is a possibility that my article may be misleading at the point where I suggest that we use "fire to fight fire." He points out that my use of the word "propaganda" is historically correct, as meaning to spread, or propagate, a faith, but that the popular understanding of the word in current parlance is the spread of false ideas, or lies. He hopes that we will not be understood to advocate the spread of lies, even in self defense.

It was furthest from my intention to suggest that any department of the Government of the United States should embark upon a campaign of lying and falsification. To do so would not only be dangerous and immoral, but, what is worse from a practical point of view, entirely unnecessary. The United States today leads the world. Our people are better fed, better clad, better housed, better educated, healthier and happier than any other people in the world. For the first time in history, the common people share the comforts and the amenities of life that have always hitherto been the privilege of the few. This in itself is a magnificent achievement, unique in history. We are also the most powerful nation on earth, economically and physically, and we are rapidly reaching a position of leadership in the arts and sciences. And we have achieved all this under a republican form of government, laid down by the founders of the nation, where every man is the political equal of every other man, and without resorting to foreign conquest or the exploitation of subject peoples.

Those are the facts. That is the truth. We have no need for lies. But in order that the truth may prevail, we must combat the emotionalized foreign propaganda that is trying to belittle and weaken us, and that gets results by an appeal to the emotions of those inexperienced voters, who are as yet incapable of pure reason. We cannot keep the truth about the United States a trade secret, with impunity. We must make an attempt to reach the new voters, the young people, the women, the foreign born, in order to tell them the truth. And when we do get a hearing we must appeal to the emotions. We must show some enthusiasm. We must not be dull. We must, as the young people say, put a little pep into our patriotism.

The English have the same problem. An episode that occurred in London was recounted in the New York *Times* of June 6, and so well illustrates the point that I quote it here:

> No long ago Prime Minister Baldwin urged the Conservative speakers not to let the Communists have all the outdoor meetings. Apparently this advice was taken to heart a couple of weeks since. An advertisement of a meeting in Holborn was printed in the Labor organ, the *Daily Herald*, reading, "Hands off China—Come and Hear the Truth." Before nine o'clock the hall was filled. A woman was in the chair, and soon introduced "Comrade Glendilling" from the Clyde. He began with some harsh remarks about British imperialism which seemed to take the fancy of the audience, and then suddenly called out, "Hands off China. But whose hands?" He answered his own question by saying with emphasis, "Why the dirty hands of Red Russia." The audience naturally gasped with surprise, but the speaker warmed to his task. He told his hearers that it was, as they had seen, perfectly easy to serve up the kind of Communist rubbish with which so many had tried to mislead British working men, but now, perhaps for the first time in their lives, they were going to hear the truth. Some attempts were made to howl him down, but he persisted, and the spirit of fair play in the audience, got him a hearing, and he finally sat down amid at least as many cheers as boos.

Dr. Lane also makes another very significant point. He says, "As a former student at Heidelberg, I got a lot of propaganda from Germany in 1914-1915-1916, which, as I knew, misrepresented things so that it had the opposite of the intended effect." But all professors who receive such literature have not Dr. Lane's intelligence and worldly wisdom. It is notorious that much subversive propaganda is being spread from university circles. It is interesting to get this bit of direct evidence as to its foreign source. Perhaps other professors who read the PROCEEDINGS can tell of similar experiences.

PROFESSIONAL NOTES

1 AUGUST TO 24 AUGUST

COMPILED BY
LIEUTENANT COMMANDER W. G. GREENMAN, U. S. NAVY
AND
ASSISTANT PROFESSOR HENRY BLUESTONE, U. S. NAVAL ACADEMY

GENERAL ARRANGEMENT

UNITED STATES

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"Old Glory," the Fokker Monoplane, During Tests at the Curtiss Flying Field Preparatory to Her New York to Rome Flight

Her pilots were Lloyd Bertaud and J. J. Hill. She was forced to wait a long time for a west wind to take off with her heavy load. It was planned for her to take off from the same raised runway on Roosevelt field that Byrd's "America" used. When the weather was right the wind was from the wrong direction and when the wind was from the west the weather was wrong. The plane with light load flew to Old Orchard Beach, Maine, and took off fully loaded from there with a passenger and was lost about 600 miles east of Newfoundland.

Courtesy of The Atchison, Topeka and Santa Fe Railway System

BATTERY OF SEVEN "CALIFORNIA LIMITED" READY FOR DEPARTURE FROM LOS ANGELES

UNITED STATES

U. S. Naval Experiment Station an Aid to Industry

By Captain H. C. Dinger, U.S.N., Officer-in-Charge, in *Power*, June 28.—The United States Naval Engineering Experiment Station, at Annapolis, Maryland, has been in operation since 1907. Although its primary purpose is to perform testing work for the Naval Bureau of Engineering, it also tests apparatus submitted by manufacturers to determine actual performance and to ascertain its suitability for use in the Navy or other government service. In all testing work the utilitarian aspect of the results are kept in view, and the Department's policy recognizes that information based on tests at the Station may be of value not only to the government, but also to industry in general. In fact, some of the results may be of comparatively little interest to naval work, but may be of great value to certain industries or to the general advancement of science. As now organized, the Experiment Station has three laboratories: Mechanical, Metallurgical and Chemical.

The Mechanical Laboratory is engaged chiefly in testing mechanical apparatus of various kinds submitted by manufacturers. This includes: pumps for boiler feed, oil service, water service, condensate, etc., together with their driving turbines; pump-control apparatus; air pumps and air ejectors; steam traps; power-plant instruments, such as recording gages, flow meters, etc.; thermometers and heat-measuring apparatus; heating apparatus, radiators, thermo tanks, etc.; heat transfer apparatus, feed and oil heaters, oil coolers, evaporators, distillers and other heat exchangers; oil purifiers; valves, expansion joints and other fittings used in connection with steam, water and oil systems on board ship; condensers and condenser materials; materials for valve trim, steam nozzles and other special purposes; refrigerating machines for shipboard use.

The laboratory also develops specifications and revision of specifications for the foregoing classes of apparatus. Its personnel is called upon occasionally to make tests of apparatus after installation on naval vessels. A further field of activity is that of making routine tests to determine suitability for acceptance lists and check tests in connection with the procurement of coal, spark plugs, taps and dies, ball bearings and grinding compounds.

Chemical Laboratory

This covers a special field of engineering supplies, which are tested and the requirements of which are set forth through the Station's activity. This involves tests to determine suitability for acceptable lists, check tests in connection with procurement and tests and investigations for the preparation and revision of specifications and requirements. The following are the principal lines covered: fuel oil; lubricating oils and greases, including aviation oil; packings and gaskets of all kinds; heat-insulation materials; rust preventives; washing and cleaning materials; boiler compound and feed-water treatment; gage glasses; corrosion deterrents of various kinds.

Metals Laboratory

This laboratory covers:

Metallographic examination of steel forgings, submitted for use by the Navy, including shafting, blading materials, tubing, plates, etc.

Investigation of properties of various alloy steels and non-ferrous materials for possible naval use.

Investigation and tests to determine improved methods and processes for production and working of metals.

Tests and investigations incident to preparation and revision of specifications for metal products such as forgings, tubing, bearing metals, boiler and condenser tubes, plates, shapes, castings, etc.

Special tests in connection with work of American Society for Testing Materials.

General investigation of corrosion fatigue phenomena for both ferrous and non-ferrous materials.

Investigation of breakages, fractures and other metal failures that develop from time to time.

Information to the Service in regard to application of metallurgical knowledge and data in various fabrication and construction processes.

Advice to Operating Service

Any ship, naval station or other activity, having a particular problem or difficulty

Battery of Seven "California Limited" Ready for Departure from Los Angeles

within the scope of the Station's activities may write for advice. The Station, after due investigation, makes a reply, sending a copy to the Bureau of Engineering. If the request entails any extensive test or is beyond the scope of the Station, the matter is referred to the Bureau of Engineering for appropriate action. Many of these inquiries refer to lubricants and packings and the suitability of various metals for particular uses or are requests for information as to why defects or failures have occurred. The information and advice given are really in the nature of expert consulting work, which on occasions is also performed for other government agencies, such as the War Department, Coast Guard and Shipping Board.

The Station prepares pertinent notes of particular developments of interest to the Service, and these are published in the *Engineering Bulletin*, issued periodically by the Bureau of Engineering. In this way such information is authoritatively and expeditiously transmitted to the Service, where it may be applied.

There is also issued a monthly report of the status of all tests, together with a list of new tests authorized during the month and a list of tests reported upon.

Among the special problems now being studied are: Corrosion and deterioration of materials and the development of preservatives and methods for preventing and arresting corrosion; industrial cleaning problems as applied to the Navy; improved methods of casting and heat-treating steel; application and use of new ferrous and nonferrous alloys; and development of light and efficient auxiliary machinery for shipboard use.

Procurement and Inspection of Supplies and Material

Tests are made to determine the suitability of various materials for placing on Navy acceptable lists. Also for certain periodic contracts, bidders' samples are tested and the report of performance is used as a basis for awarding contracts. Still another service is that of testing samples selected by inspectors from deliveries. Furthermore, in the case of lubricating oil samples in use are sent in so that the actual condition of oils in service can be determined.

The Station has developed the metallographic requirements for steel forgings, boiler and condenser tubes and other special material. It has greatly reduced the cost of fuel oil, lubricants, packing, gage glasses, coal, spark plugs, taps and dies, boiler compound, rust preventives, cleaning materials, and at the same time insured that the Navy was being supplied with the best quality of these materials that could be obtained commercially. This action also is continually spurring on manufacturers to improve their product and to secure more economical production.

Tests for Manufacturers

Manufacturers who are developing new designs of apparatus can have these exhaustively tested by securing authority to have tests made, a fee covering the actual material and labor cost of the test being charged. Indirect expenses are not included so that the testing charge is really somewhat less than the actual cost. The government benefits by the experience and information obtained from the test. The manufacturer has the opportunity to have his apparatus tested by experienced personnel, familiar with the practical use to which it may be put, and in this way is often enabled to improve or perfect his apparatus at a comparatively small outlay before placing it on a production basis. In some cases defects are brought to light, which, if not remedied, would have prevented successful marketing. In many cases the manufacturer has inadequate testing facilities of his own, and to provide special apparatus is often quite expensive.

About five hundred reports of tests are made per annum. Some of these are quite elaborate and have extensive enclosures, drawings, photographs, tables, etc., yet the expense of operating the Station is comparatively small. All told, including the special deposits made by manufacturers and allotments received from all government activities, the sum spent annually is less than a quarter of a million dollars. The field of usefulness of the Station could be increased materially by providing larger appropriations, now only $175,000 a year and by private firms having more testing work authorized.

AUTHORIZATION AND COST OF TESTS

The general requirements on which the suitability of material for use on naval vessels is based are set forth, as follows:

(*a*) Maximum reliability.

(*b*) Minimum space and weight factors.

(*c*) Maximum accessibility for inspection, maintenance and repair.

(*d*) Maximum resistance to corrosive action, in particular that of moist sea air.

(*e*) Maximum operating and maintenance economy.

(*f*) Satisfactory operation when permanently inclined up to fifteen degrees from the normal horizontal position in any direction; also when used on moving platforms rolling up to forty-five degrees from the vertical to either side, dependent on the type of vessel. In this connection it is important that all rotating machinery be installed with the axis of rotation parallel to the keel of the ship.

(*g*) Satisfactory operation under the large uneven stresses induced by the laboring of a vessel in a seaway and the variable propeller load.

(*h*) Satisfactory operation under vibrations of the mounting at fairly high frequencies.

(*i*) Satisfactory operation under very heavy shock to mounting and structure.

(*j*) Maximum interchangeability of parts.

(*k*) Minimum number of necessary spare parts together with the best facilities for stowage and handling same when furnished.

(*l*) Satisfactory identification of all equipment and parts for ease in accurate requisitioning from distant parts of the world.

(*m*) Satisfactory plans and drawings with full and concise manufacturing and operating instructions.

(*n*) Readily susceptible to repair by naval personnel, and with the facilities ordinarily to be found on board vessels of the Navy.

The requirements for test are:

(*a*) That the material or device offered shall have definite application to naval needs.

(*b*) That it actually has been built and is ready for test.

(*c*) That the government shall not be involved in any expense whatever either for the cost of the test, the material or apparatus tested, the shipment charges to and from place to test or damage to material or apparatus in consequence of the test.

(*d*) That the results of the test or the fact that test has been conducted shall not be used for advertising purposes.

Application for test should be made in writing, to the aforementioned Bureau of Engineering, Navy Department, Washington, D.C., and if the nature of the article to be tested is not known or has not been explained in a personal interview, the application must be accompanied by a complete description and blue prints, if necessary, for thorough understanding.

If a test be authorized, the applicant will be put in communication with the Officer-in-Charge, Naval Engineering Experiment Station, Annapolis, Maryland, or with the commandant of the navy yard concerned,[1] who will furnish information as to any special requirements in connection with the test and will also designate the deposit which it will be necessary to make to cover the probable cost of test. Tests will be undertaken as promptly as practicable after authorization, urgent government tests taking precedence over all others.

When all necessary information has been received by the exhibitor, the material to be tested shall be shipped to one of the following addresses as the case may be, and clearly marked as "Samples for Test":

(*a*) For the Naval Engineering Experiment Station, address to "Supply Officer, U. S. Naval Academy, Annapolis, Maryland, for Engineering Experiment Station."

(*b*) For Fuel Oil Test Plant, address to "Supply Officer, Navy Yard, Philadelphia, Pennsylvania, for Fuel Oil Test Plant."

(*c*) For Electrical Laboratory, address to "Supply Officer, Navy Yard, Brooklyn, New York, for Laboratory Officer, Building 22."

[1] The Bureau of Engineering, Navy Department, has three testing laboratories: The Engineering Experiment Station at Annapolis, the Fuel Oil Test Plant at the Philadelphia Navy Yard, and the Electrical Laboratory at the Brooklyn Navy Yard. The Naval Research Laboratory at Bellevue is administered under the direction of the Technical Aid to the Secretary of the Navy and does special research work not covered by the laboratories under the cognizance of the Bureau of Engineering.

Representative of Applicant May Offer Suggestions

The exhibitor will be allowed to have a representative present during all tests made upon the material submitted by him, and he or his representative may make suggestions or objections concerning the method of carrying out the test; the time for the test shall be set at the convenience of the laboratory concerned, and the exhibitor will be notified if he has previously indicated a desire to have a representative present. Such suggestions will be followed by those conducting the test in so far as practicable and consistent with the purpose to obtain complete and conclusive data. The test authorities will be free to submit the apparatus or material to any test which in their judgment may be desirable to determine its suitability under any special requirements for use in the naval service, whether such tests have been contemplated by the exhibitor or not; except that, in the single case where the exhibitor objects to any proposed test on the ground that he believes the apparatus or material would be injured thereby, and embodies his objection in writing, the particular test will not be made. Any such objection will be made part of the record of the test.

All applicants must agree in writing to accept the conditions of test set forth in this circular, and must further agree in writing that they will accept the results of the test as final and that they will not apply for a retest of the article or material until such changes have been made as will give reasonable promise of overcoming defects which may have developed during the course of the original test.

Upon completion of test a copy of the report thereon will be furnished the exhibitor by the Bureau.

GREAT BRITAIN

The Geneva Conference and British Naval Policy

Engineering, August 12.—It would be tedious and unprofitable to examine plans of naval limitation which have been rejected, or to discuss figures of total cruiser tonnage which nobody has accepted, and ratios of relative strength which have never been more than bare proposals; but because the concrete projects laid before the recent conference have been abandoned, it does not follow that the discussions which those projects provoked are devoid of interest. It is, indeed, our present purpose to endeavor to make the British case at Geneva as clear as we may, and to illustrate it by explanations of the concrete problems of British maritime strategy.

In our last article upon the Geneva conference, we analyzed and discussed the proposals which the British, Japanese and United States delegates had made. We came to the conclusion that the Japanese and British plans were sufficiently similar in aim and substance to be welded into an agreement, but that the United States' project had been drafted with little regard to defense problems, and the military security of Great Britain and Japan, so that it could hardly be treated as a serious contribution to the cause of naval disarmament. Subsequent events have shown that our conclusions were sound. The British and Japanese experts have twice drawn up the plans of a scheme satisfactory to both parties; the Americans have twice rejected them and have refused to modify their original draft sufficiently to make it acceptable either to ourselves, or, presumably to the Japanese. This refusal has been an impassable obstacle to successful negotiation.

But although the discussions at the conference gave no practical result, they provoked several very important statements upon British naval policy. The British Government, speaking through its delegates, has made a concession to the United States which will probably be a very important mark in British naval history. The long discussions which arose on the tonnage of ocean cruisers, and the calibers of guns in cruisers, revolved round certain cardinal points in our system of trade defense; and in this connection it was found, unfortunately, impossible to discuss matters without contrasting and comparing the naval strength of the United States and Great Britain. The responsibility of ventilating so delicate a

(Editor's Note: Perhaps too much has already been written about the Conference which failed, but the following is reprinted in order that American readers may see how this British editorial writer views the cruiser question. The American plan at Geneva seems simple and fair to us when viewed in the light that "war is unthinkable" between the two countries. *Engineering* apparently does not subscribe to this premise.)

subject does not, however, rest with our delegates; they were compelled to do this from the moment that the United States' representatives placed their demand for parity before the conference, without justifying it by any strategical arguments. Since such a demand brings, at once, into the range of vision the possibility, however, remote, of the two Powers being adversaries, the British delegates were driven to show how it might affect this country's security. As our defense policy had rarely been discussed with such freedom, it is well worth while to relate the statements made to the concrete problems of British naval strategy.

First, as to the concession made by the British Government. The British delegates stated that Great Britain would not object to the creation of an American cruiser fleet equal in numbers and tonnage to the British. Before the conference assembled, we examined the strategical implications of this concession if ever it were made; and there is no need to repeat what we then said. But as naval programs, problems of naval security and trade defense are only aspects of national policy, it is necessary to explain the extraordinary significance of the step which the British Government has taken. In a previous article we proved, that, if the United States ever create a cruiser fleet numerically equal to the British, they will reach a position of strategical superiority to us, in that they will be able to concentrate forces superior to our own at points of their own choosing; and those points might be upon the vital arteries of our system of trade circulation. In other words, we shall, from then onwards, depend upon good diplomacy, alone, for a certain proportion of our daily necessities. There have been periods in English history when distant possessions have been left uncovered, and there have been moments when our dispositions have been inadequate and faulty; but never since Charles II laid up the fleet prematurely, and exposed us to the stroke against the Medway, has the British Government been willing to take the risk of leaving a vital point covered by nothing but a prospect of good relations with a possible adversary. This, moreover, is only one aspect of the concession that we are prepared to make. The British maritime frontiers—this is the term we have always used when writing of our vital arteries of commerce—will not, we believe, be exposed to attack by a state with which Great Britain has so long maintained unclouded relations. We have ever believed, and the reasons for our belief are as strong today as they were before the conference assembled, that public opinion in the United States will not allow friction and disagreement between the two countries to develop into a serious quarrel. None the less, the political forces which have created this demand for naval equality with Great Britain derive a great deal of their strength from the unfriendliness of a section of the American public towards the British nation. It would be as foolish to dwell unnecessarily upon these unpalatable facts as it would be to ignore them altogether.

A reticent, but highly significant, explanation of British naval policy was, however, added to the concessions made to the American delegation. Mr. Bridgeman and Lord Jellicoe showed that the British plans for the defense of the trade routes had been drawn up on a calculation of the total number of cruisers which would be required; and that it was this number of cruiser units, not their total aggregate tonnage, which was our principal concern. The figure given by us was seventy; and Lord Jellicoe added, during the discussion, that of these seventy ships, thirty would always be allotted to the battle fleet. This means, that even when our cruiser fleet is expanded to seventy units, only forty cruisers will be available for the defense of the trade routes. The figure is extremely low; with such a force, it would be almost impossible to put our Atlantic trade under convoy, and we may, therefore, take it for certain that our plans for defending the Atlantic trade routes are substantially the same as they were in 1914. If a political crisis arose, cruisers would evidently be allotted to the focal and terminal points of the Atlantic trade routes; and merchant traffic would proceed freely, without covering escort.

The British delegates also made it clear, that, in their opinion, this system of trade defense could give our maritime communications the degree of security necessary for maintaining the flow of seaborne trade, even though the United States Government created a cruiser fleet of equal tonnage to our own; but they were quite emphatic that they could only agree to this numerical equality between our own and the American fleet, subject to certain limitations. An ex-

planatory digression is here absolutely necessary, if the real meaning and significance of these limiting conditions, which were the central points of all the British contentions, are to be understood.

Although the United States, with a cruiser fleet equal in numbers to ours, would always be able to concentrate a force greater than our own at points of their own choosing, this strategical inferiority of the British fleet might be mitigated by special arrangements. It is not absolutely impossible to maintain a flow of trade along distant communications in the face of superior forces. In the French wars of the eighteenth century, the French naval authorities, though their squadrons were generally outnumbered, managed to get the bulk of their colonial trade past our watching cordons, and their foreign commerce was only effectively stopped when their colonies were captured. Machine-propelled ships have an even greater power of evasion than their wind-driven predecessors; the flow of modern commerce is continuous, instead of being spasmodic and interrupted, as it was 150 years ago; and cargoes are carried in ships which sail independently, instead of in groups. Moreover, modern ships may be diverted from their ordinary courses and routes by wireless telegraphy. All this makes seaborne commerce difficult to arrest, and it may, in certain circumstances, be maintained even though a powerful adversary attempt to stop it. There are two conditions under which commerce may be thus maintained. The routes along which that commerce flows must be so far from the enemy's operating bases that his ships are only able to operate against it spasmodically; and the striking force that he assembles for operations against the trade route must not be overwhelmingly large. Let us, then, apply these abstract principles to a concrete problem of trade defense.

It so happens that the South American route, which leads to one of our great sources of food supplies, and to an alternative market for grain, if our Canadian and United States sources should ever be closed, is a route which might be protected by a strict control of the merchant traffic that uses it. The West Indies trade, whose starting points are nearer to the American bases, would not be so easy to defend by measures of diversion and control; but if any one of the three great Atlantic trade routes could be made relatively safe with a small naval covering, there would obviously be more ships for the protection of the remaining two. The basic condition for this kind of security is, as we have said, that no possible adversary shall be able to assemble an overwhelming force for an attack upon the trade. The British delegates have negotiated for this condition with tireless persistency. It was this preoccupation which compelled them to protest against the proposed creation of an American fleet of twenty-five 10,000-ton cruisers, for this would be a striking force of the first order of magnitude; it also animated the British proposals for restricting 8-inch gun armaments to their lowest possible limits, and inspired Mr. Austen Chamberlain's statement of British policy in the House of Commons.

As no power attending the conference has agreed to alter or limit its existing program, but as the delegates have been quite emphatic that the position will be reconsidered in 1931, it follows that the only way of assessing Great Britain's position at sea, is to relate existing programs to the statements of British policy which have been so frequently and emphatically made. Does the breakdown of the conference affect our security at sea, either actually or potentially? Are the conditions which we added to our concession of naval parity with the United States, endangered by that country's freedom from the obligations of a formal diplomatic agreement? There is only one way of examining this question. It is to analyze the actual composition of the American cruiser fleet, to calculate its prospective strength four years from now, and to juxtapose the results of the analysis to the cardinal problem of our naval security. Does the existing American problem tend to create a large Atlantic striking force, available for continuous operations against distant routes, and does it, on that account, endanger the condition that the British delegates have striven so hard to secure?

As the British Government agreed to an Anglo-Japanese ratio of naval strength, which, if adopted, would give the Japanese a larger cruiser fleet than she actually possesses or proposes to build, only the American fleet and the American building program need be examined.

At the present moment, the American cruiser fleet is composed of:

(1) Three cruisers of a 14,500-ton type, armed with 10-inch and 6-inch guns.
(2) Five cruisers of a 13,680-ton type, armed with 8-inch and 6-inch guns.
(3) Two cruisers of a 9,700-ton type, armed with 6-inch guns.
(4) One cruiser of a 8,150-ton type, armed with 8-inch guns.
(5) Ten cruisers of a 7,500-ton type, armed with 6-inch guns.
(6) One cruiser of a 5,865-ton type, armed with 5-inch guns.
(7) Three cruisers of a 3,750-ton type, armed with 5-inch guns.
(8) Two cruisers of a 3,430-ton type, armed with 5-inch guns.
(9) Five cruisers of a 3,200-ton type, armed with 5-inch guns.

In addition two 10,000-ton cruisers have been laid down and six more have been authorized. American yards can build a large cruiser in about four years, so that in 1931 American naval strength will be increased by at least eight new cruisers of the newest type. Let us, therefore, examine the probable duties of this mass of ships as closely as possible.

Of the nine classes of American cruisers, class (5) will certainly be required for fleet work, and would not be available for war upon commerce. Also, class (9) would hardly be used for this. Two questions, therefore, remain to be solved: Whether the new 10,000-ton cruisers would be available for an attack upon trade; and whether the cruisers not suitable for fleet reconnaissance work could be used for commerce warfare? With regard to the first question, there can be little doubt that, although highly unsuitable for the purpose, the new American cruisers could be used as striking squadron for operations against trade; and that they need not necessarily be allocated to the reconnaissance forces of the American battle fleet. Admiral Scheer's North Sea operations showed that fleet reconnaissance forces can be husbanded and cut down by a bold use of the fleet air arm; the Americans could do as he did, and could also use their immense surplus of destroyer tonnage for fleet reconnaissance over short distances. They might, therefore, use their eight 10,000-ton cruisers for operations against trade in the south Atlantic if they were prepared to allocate an immense amount of collier tonnage to them. Eight vessels of this class would not, however, constitute an overwhelming striking force. They would only be able to operate together, in full force, in spasmodic operations, and spasmodic operations against trade—which flows continuously—will never do more than dislocate it for a certain time. If the American cruisers were used continuously, not more than five would ever be available at any particular moment. Five heavy cruisers operating against a distant though highly important route is a danger of manageable proportions.

It is not so easy to answer the second question: whether American cruisers in classes (1) to (4) and (6) to (8) of our enumeration could be used for sustained operations against trade. They are mostly old very heavily gunned cruisers of slow speed; and could certainly not be used for fleet reconnaissance. Cruisers of this class will always be admirable escorts for merchant convoys; but it is doubtful whether they would be as useful for attacking as for defending trade. We have no concrete cases from which to draw conclusions. This much, however, is a matter of fact. During the war, the Admiralty maintained a continuous cruiser patrol in the Rocas-Fernando Noronha and the Canaries-Madeira zones, and the patrol was carried out by old, heavily-armed cruisers of the type we are discussing. Cruisers of this kind can, therefore, be maintained upon distant stations, at great distances from their repair bases for long periods of time. What the British Admiralty could do with such ships as the *Essex*, the *King Alfred*, the *Donegal*, and the *Highflyer*, the American Navy Department could do with such ships as the *Seattle*, the *St. Louis*, and the *Huron*. As practically no American cruiser tonnage would be required for protecting trade, it therefore seems fairly safe to say that the Americans are able at the present moment to set up permanent cruiser patrols for intercepting commerce near the western terminals of our Atlantic trade, and that they will be equally able to do so in 1931. They have between fourteen and fifteen vessels available for the purpose. This, it must be admitted, is not a serious matter to us. The lighter, 6-inch gun cruisers that we should allocate to the defense of trade would not be able to fight these heavy American cruisers in a prolonged duel; but recent experiments in the practical problems of trade defense have shown that this is not neces-

sary. If these vessels operated, in concentrated squadrons, against local and terminal points of trade, which were being patrolled by our lighter 6-inch gun cruisers, they could certainly not destroy vessels so much faster than themselves; and so long as these slow attacking squadrons could be located and shadowed, the amount of commerce destruction they could do would be extremely small. These old ships would, possibly, be more useful for attacking convoys; but convoys can, in some cases, be protected by vessels of very much lower fighting power than the attacking force. All that the defending vessels have to do is to fight a delaying action until the convoy has dispersed and scattered. Many naval officers believe that ocean-going submarines of the 1,600-ton type could be used most effectively for escorting merchant traffic, so long as not less than three or four submarines were allotted to each convoy, and that the merchantmen were provided with good wireless and had an efficient signaling staff. We can safely conclude, therefore, that if in 1931 we have some thirty cruisers available for trade defense, they will be sufficient to protect our trade against attack from the strongest possible adversary. We can, on this account, view the breakdown of the conference without apprehension. The failure to reach agreement creates no new danger, and increases no existing one. Indeed, as the discussions show that the British delegates had set a limit to the concessions that they were prepared to make, and were never tempted to extend those limits for political expediency, the negotiations can be said to have ended in a British success.

Capital Ship Speed

Naval and Military Record, July 20.—A naval correspondent favors us with some interesting comments upon certain remarks which recently appeared in this journal regarding the speed of the two new battleships *Nelson* and *Rodney*. He says: "I cannot for the life of me see who will ever fight them, or even need to fight them, for, seeing that they are recognized as the most powerful floating fortresses in the world, everybody will take very good care to keep out of their way." This, of course, comes directly to the point upon which the argument that the battleship has outgrown her utility primarily rests. It seems rather a futile process to build the most powerful fighting ship in the world unless she is to have a chance of employing her fighting powers. In the Great War our battle fleet served its purpose by containing the German battle fleet by virtue of its great superiority of strength. But we cannot count upon a repetition of such favorable strategical conditions. In oceanic war—e.g., war in which the combatants are separated by very wide spaces of sea—the battleship must play an active rôle if she is to justify herself. The negative part of a "home guard" will serve no purpose when geographical conditions enable an enemy to come and go at will.

The American naval authorities are said to regard the capital ship as a sort of mobile base for covering the operations of light squadrons, and to hold the view that a sufficient number of capital ships strung out at wide intervals in the Pacific would compensate for their shortage of regular bases in that ocean. The idea is distinctly spectacular. Attended by oil-fuel auxiliaries, a battleship might remain on an ocean station for a considerable period. But how she is going to "cover" any cruiser operations we confess our inability to realize, since she would be attempting to deal with forces which would probably have a superiority in speed of about ten knots. At best she could serve as a protectionary craft for any cruisers or auxiliaries which might concentrate upon her. But the conception is quite new in any survey of the most extended functions of the capital ship. And why employ a battleship for such a purpose in which heavier gun power alone appears to be the only requirement? Surely vessels of our own "hush hush" type, possessed of a speed which would enable them to take a part in the operations for which they were detailed to act as mobile bases, would be very much more suitable.

That our own Admiralty are not unimpressed by the arguments of what may be called the anti-battleship school is certainly suggested by the proposal submitted by Mr. Bridgeman to the Three-Power Conference to limit the future capital ships to 25,000 tons in displacement and to 13.5-inch guns in armament. This would mean reverting to the *Iron Duke* type. It may be true to say that functions should have no relation to type, within limitations, of course; that if the battleship is justified at all she is justi-

fied in her most powerful form. This appears to be the American view, and, at any rate, it has the merit of expressing a definite conviction. Time was when we built first class, second class, and coast-defense battleships, presumably on much the same line of reasoning which produced line-of-battle ships ranging from 64 to 120 guns. But for a good many years past we have followed a uniform policy of successive "last words." The British proposal at Geneva is not so much a compromise as a stabilizing of the "last word" at a standard which is quite adequate to all the needs of naval warfare. Restricting armaments means reducing something somewhere.

Returning to the comments of our naval correspondent referred to above, he expresses the opinion that "a ship like the *Nelson* will be very much harassed by high-speed cruiser-minelayers, able to 'make rings around her,' which rings will be very nasty to bump into." Such a suggestion appears to us to presuppose that she will be acting independently. As a fleet unit she would be protected against any such threat, as against submarines, by cruisers and destroyers, which should be quite capable of dealing with any cruiser-minelayers. It is reasonable to assume that the modern battleship is able to take her own part against any form of aggression. Her disability does not lie in her vulnerability, but in her difficulty in bringing an enemy to action. The more powerful she is the more the enemy will avoid her. This was the lesson of the Great War. The argument that the modern batlteship is not primarily designed to fight pitched battles, but to hold the ring to permit of the activities of smaller craft, does not much appeal to us. It seems rather purposeless to construct a terribly costly and most mighty fighting machine which is not really intended to fight.

FRANCE

For Our Maritime Aviation

Review Maritime.—Our Brest correspondent recently gave an account of trials made in that port, first on the dike of the roads, then aboard the cruiser *Primauguet*, with a catapult throwing the hydroplane at a speed of about 100 kilometers per hour. These trials proved to be a perfect success and it is hoped that all our cruisers as they enter service will be provided with an apparatus enabling them to experiment at first, and to use afterward hydroplanes they have aboard.

On the other hand, it is reported from Toulon that the *Bearn*, a former battleship, the transformation of which into an aircraft carrier was provided for by the Act of April 18, 1922, is ready to begin sea trials.

We see therefore the French Navy imitating, though on a very small scale, the great navies who for a long time have had special aircraft carriers as well as hydroplanes embarked aboard their warships. In a study of the subject published last year in these columns, we showed how much importance is attached abroad to airships considered hereafter as an arm indispensable to the effectiveness of a squadron. Since then the maneuvers conducted in the British Navy between the Atlantic and Mediterranean squadrons in the waters of Gibraltar have served the British commander as an additional occasion for a careful study of the use of this arm. The British Admiralty considers it so useful that it did not wish the Far East Squadron to be without it. Just as a large number of flotillas of land planes are being sent to support British Expeditionary Forces at Hong-Kong and Shanghai, the aircraft carrier *Hermes*, whose machines fly over the Yang-Tsi, has been sent forth.

It is possible that embarked machines are, at present, in America, in England and in Japan, the object of a somewhat exaggerated infatuation. The use of airships in coöperation with a surface naval force is considerably less easy than imagined at first sight. To send machines on a reconnoitering expedition, to charge them with bombarding enemy forces or assign them the duty of fire control is a relatively easy matter. The difficulties begin when it is a question of receiving information they give; these difficulties grow particularly more serious as soon as it is desired to receive these ships aboard upon their return. After that, the question as to how the aircraft carrier is to join the squadron is a problem the solution of which depends on circumstances and does not always appear possible. But it is these difficulties that should call forth the desire that our navy should, without delay, make as complete experiments as possible.

Strange to say, we are relatively less ad-

vanced in this respect than before the war. In 1914, the cruiser *Foudre* was already fitted out to carry and maintain three hydroplanes. It was a very incomplete solution of the question of squadron aviation, but it was good for the time. We are not so far ahead at present.

Some thought that by waiting for the completion of the *Bearn* we could have proceeded, with whatever means we chanced to have, to at least some of the experiments. But it would have proved difficult to have the casual means in question materialize in a satisfactory and really instructive manner, as it was absolutely necessary that the ships charged with carrying out those experiments should have the means of despatching and receiving their hydroplanes. The plan was given up and it seems there is no reason for regretting such decision. Hasty conclusions based on fragmentary documentation could not have much value. But delay in the completion of our only aircraft carrier brought about the result that what we call squadron aviation is in reality ordinary aviation, having frequent drills with warships, but having as bases Saint Raphaël and Palyvestre and differing in no way from our other land-and-sea formations. The French Navy as a whole seems to entertain much scepticism with regard to embarked aviation; and there is no doubt that this feeling is, beyond doubt, traceable to relative inertia which is noticeable. This scepticism, however, is dangerous. The efforts made in other navies have certainly yielded positive results; and if we don't know them in detail this is not a sufficient reason for denying them. On the contrary, we must make an effort to obtain similar results, within the limits of our means and without any further delay. Being better informed, we shall know whether we want to build the aircraft carriers which the Agreements of Washington allow us to have. So long as we have not ourselves made enough experiments, the opinions expressed in France for and against squadron aviation will be of little interest.

For other classes of maritime aviation, the budget of 1927 gives the means to continue, though in a slow fashion, the execution of the general naval aëronautic program proposed to the Chamber in the Bill of 1925, which bill, as is well known, has not yet been brought before Parliament for discussion. The first annual appropriation was contained in the budget of 1926; this is, therefore, the second. It provides for the creation, in the course of the present year, of two bombardment flotillas of twelve planes, and of a pursuit flotilla consisting of sea double seaters which took the prize at the Saint Raphaël contest in 1925, and which are to enter service in 1928 with all their equipment, and their spare parts.

But a similar increase provided for 1926 could not be fully carried out: the technical aëronautic service, which is under the jurisdiction of the Ministry of Commerce and which alone is charged with the award of contracts has been so slow that the Navy Department has been obliged to protest vigorously, and it is by no means certain that the situation is different in 1927.

The program of aviation bases is likewise being executed with little speed. Parliamentary committees have complained about it on various occasions. "It would be desirable," wrote the reporter of the Navy budget last year to the Chamber, "that the work be arranged with method, with proper appreciation of the importance of points chosen." Have we not seen in previous years important work undertaken, then abandoned, then resumed, at times with increases in cost which would easily have been avoided if the plan had been maturely and inflexibly been fixed invariable with change of persons. How many millions, for instance, have been swallowed in the hydro-aviation center of Chantereyne, at Cherbourg! Yet the least that could be said of it is that its location is entirely subject to discussion.

At the end of 1926, seventeen centers or bases were being established. The work involved as much as 200,000,000, the amount expended hardly 70,000,000. If the center of Palyvestre was sixty-six per cent done, that of Karouba (near Bizerta) sixty per cent, those of Cherbourg (Querqueville and Chantereyne) fifty per cent, the aviation base of Brest, on the other hand, was only four per cent done, and the one of Toulon-Saint Mandrier two-tenths per cent.

The reporter of the budget of 1927 in the Senate points out that, for some of these bases, the ground plans had not yet been finally settled upon at the end of 1926. It is well known that these delays are, to a great extent, due to the unfortunate suppression, in 1922, of the corps of hydraulic engineers. This is an example of an absurd

reform, though maintained by arguments that appear excellent; as a most decisive result of this reform, the navy has been unable, since that time, to carry out any improvements in ports. A provisional solution has since been found, and it is to be hoped that the situation will improve even if it fails to come up to normal. But the delay caused in preparing the plans is not less than that observed in their execution.

As to the personnel, the navy pilots are excellent and the recruiting satisfactory. On the other hand, the recruiting of mechanics, engineers, observers, etc., is short and the Department will have to take the necessary measures to put it on an absolutely certain basis; otherwise the increase in the number of squadrons would be impossible.

The general naval aëronautic situation has certainly improved very much in the last year or two. But there was so much to do after the period of complete stagnation following the war that it is impossible to dig oneself out of it in a short time. In the defense of those who have, during recent years, been in charge of our naval aviation, we may call attention to the serious difficulties of a technical order in the choice of machines as well as those resulting from the situation of the material—hydroplanes, motors, hangars, etc.—after the war. But it must also be recognized that unity in point of view was lacking for too long a time, that the navy was feeling its way in several directions at the same time, that there was a lack of consistency and of determination. It is not only to the shortage of personnel in the hydraulic service that we must attribute the small proportion of the appropriations actually expended during recent years: in 1924, 20,000,000 out of 105,000,000 available; in 1925, 28,000,000 out of 107,000,000; in 1926, hardly 50,000,000 out of 91,000,000. Financial difficulties have had their share in the delays of which we complain. It is time that an energetic stimulus be given to put an end to these delays.

HENRI BERNAY

SPAIN

Naval Notes

Review Maritime, March, 1927.—The recent declarations of the Spanish Minister of the Marine to the effect that the building up of the Spanish Navy was in full sway, frequent articles published by the Madrid press on naval questions, and finally the approval, in July, 1926, of an important extraordinary budget which will make it possible to devote to the building of new ships and to naval bases, for six years, twice the amount Spain has been spending heretofore indicate to what extent Spain and her government are interested in the development of the navy and the sentiments they entertain concerning the rôle Spain can play by reason of her geographical situation and the importance of her Mediterranean coasts.

A well trained Officers' Corps imbued with an excellent spirit has been facilitating the task of the different governments that have had the courage to pursue the policy of rehabilitation of the Spanish Navy.

Furthermore, for several years nothing has been left undone in the efforts to get the best results out of the personnel already on the rolls and to give that personnel the education required by the progress of modern navies and the use of new arms. The school recently created assures the navy all necessary development according to requirements of newly arising conditions and of securing the specialized personnel that may be necessary.

The school for submarine navigation at Cartagena has been provided with a most modern equipment, full advantage being taken of what has been done in other countries.

At Barcelona, the Naval Aëronautical School, which began rather modestly, has become, for maritime aviation, an important base for training and practice; the construction and repair shops annexed to it have made it the great naval aëronautic center of Spain.

Two years ago, the Spanish Government established at Marin, Galicia, a target practice area for artillery officers and, at Madrid, the Graduate Naval School, whose curriculum is about the same as that of similar schools in other navies.

Finally, although the Minister ordered the suppression of the Engineers' and Naval Artillery Schools, probably because the ranks were being crowded, these schools have already trained engineers who have relieved the Spanish Navy from dependence on foreign technical men for the construction and armament of ships.

While proceeding with the education of the personnel, the Spanish Navy devoted its energies to the development of its power

in the execution of the programs laid out: that of 1908, which required the building of three battleships, three destroyers, twenty-four torpedo boats, three gun boats; that of 1915, which provided for four fast cruisers, six destroyers, twenty-eight submarines, three gun boats, eighteen patrol boats.

The Order of March 31, 1926, provided for the building of a new cruiser of 7,500 tons and three flotilla leaders; a few months later, in July, 1926, the Spanish Government adopted an important building program, including: three cruisers of 10,000 tons, three new flotilla leaders, twelve submarines, and auxiliary ships.

A special appropriation of 877,000,000 pesetas, spread over six years, was provided for this construction program and for naval bases.

It is to be remembered, of course, that the program of 1915 could not be entirely carried out, at least so far as submarines are concerned. Accordingly, upon completion of the new program, Spain will have twenty-eight submarines, the number provided for in the 1915 program.

The war caused delay in the execution of the programs of 1908 and 1915, because to a great extent Spanish industry had remained until recently dependent on foreign industries. That is why Spain sought to become independent by developing at home the industries that can be sustained by her considerable sub-soil wealth. That object has been attained. On the occasion of the adoption of the program of July, 1926, the Minister of the Navy was able to state that the new ships would be built, not only by Spanish technical men, but also out of a material produced in national mills.

To sum up, thanks to consistent efforts made in all branches of the Navy, Spain will, in a few years, have a navy which she will not fail to make as powerful as allowed by her means, and there will be no lack of elements contributing to the material importance of her navy: knowledge, courage, devotion maintained by old traditions in the entire personnel of the Spanish Navy.

Said the Minister of the Spanish Navy in 1926:

> I have always had the desire, since I have been representing my Department, to have an efficient navy, answering the needs of the day. Navies are expensive; that is why I shall try to avoid all unnecessary expense. But such result is not attained without painful sacrifices. The Spanish Navy has a high conception of patriotism and has willingly yielded to reductions demanded by hard realities.

This operation, continuing since June, 1924, to date, consists in putting out of commission ships that can no longer be used and a considerable reduction of the personnel in the various naval corps.

. . . . . .

The corps of auxiliary Marine Reserves has been suppressed. The king signed an order allowing ensigns and petty officers of this reserve corps to enter the active ranks, as in the army, after going through the required program of studies.

Only two items of appropriations can be changed: that of fuel and that of repairs and careening, as both are subject to modification.

The Minister spoke with high praise of the instruction given at the artillery practice school, of Marin, and showed great satisfaction in view of the complimentary accounts of the foreign press. His closing words were:

> This is a decisive moment for the undertaking of reforms in the navy. I have done nothing but continue the work of my predecessors, giving it a new form and trying by all means to assure that our navy be absolutely efficient and able to serve, as she does, the highest interests of Spain.

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ENGINEERING

A Hundred Years of Steel Improvement

By courtesy of the International Nickel Company.—Age of itself is significant. The oldest ship, the oldest automobile or the oldest process is, of itself, interesting. But in the case of nickel alloy steel, age becomes more than a matter of passing interest. It has a significance which cannot be overlooked by anyone who uses or specifies metals.

Nickel alloy steel was born thirty years before Bessemer astonished the world with his converter process. As a matter of fact, a form of nickel alloy steel was present in those early meteorites which provided the eighteenth century scientists with a favorite topic of discussion.

The significance of the age of this alloy steel lies in the fact that in the many years of its development it has been put to almost every imaginable test. It has been studied in the laboratory, used in the field, and dis-

cussed by the world's engineering societies since the days of Faraday.

It is only through such trials and tests that the real worth of any material may be thoroughly determined. It is through just these uses and varied applications that nickel alloy steel has finally won its way to acceptance as a standard alloy steel of industry.

Since the time of Faraday, metallurgists have not only studied nickel alloy steels, they have examined and experimented with these alloys and then placed their findings in such form that ensuing generations might profit by their experience.

It was not until about the beginning of the twentieth century, however, that engineers began to employ the fund of information that had been accumulated. Since that time, engineering societies in many different fields of activity have developed an increased appreciation of the importance of metallurgical knowledge, with the result that data and findings have been tabulated and recorded for the world's benefit.

The many years of nickel alloy steel development have contributed to an extensive fund of information concerning the superior properties and many uses of these alloys. In order that industry, generally, may use these data, the International Nickel Company has prepared a special series of bulletins dealing with nickel alloy steels. These bulletins are sent at regular intervals to a large list of steel producers, engineers, metallurgists, societies, etc. They are also sent in response to requests received as a result of nickel alloy steel advertising.

MISCELLANEOUS

The Evolution of the Barometer

Tycos, July, 1927.—In *Tycos-Rochester* for October, 1923, the late Dr. C. LeRoy Meisinger presented a fund of interesting information concerning the origin and earliest uses of that all-important meteorological instrument, the barometer. In the following paragraphs we shall sketch briefly the striking developments this instrument has undergone and some of the diverse forms it has assumed since the days of its invention in Italy.

It should be remarked at the outset that the principle embodied in the old tube of Torricelli has never been supplanted by any better method of measuring atmospheric pressure. The most refined barometers of today involve merely improvements in details. Though meteorologists have lately taken to recording barometric observations in units of pressure (millibars), instead of units of length (inches or millimeters), the values in question are actually deduced from the height of a mercurial column.

Torricelli himself noticed that the height of the mercury in his tube varied from time to time, and the additional fact that its height varies with altitude was proved by observations on certain towers and finally by the famous experiment made by Perier, at the suggestion of Pascal, on the Puy-de-Dôme, in the year 1648. That there is some connection between the rise and fall of the barometer and changes in the weather was noted a few years later, and was so generally recognized by the end of the seventeenth century that the custom was already common of attaching to barometer scales words indicating the kind of weather to be expected with different heights of the mercury.

The first barometer differing in form from the simple straight tube and cistern was the siphon barometer, in which the open lower end of the tube is bent upward, so that the whole has the shape of the letter J. This type of barometer is said to have been proposed by Torricelli himself. In the year 1664 Robert Hooke, in England, introduced a form of siphon barometer to be read by means of a dial. A metal float was placed at the top of the mercurial column in the short arm. To this was attached a cord, running over a pulley and having a counterpoise at the other end. When the barometer rose and fell, the pulley was turned by the cord, and caused an index to move around a gradual dial. The same principle has been used in many later barometers; especially in the old-fashioned "weather-glasses," or dial-barometers, which were very popular household instruments until generally replaced by aneroids.

In the *Philosophical Transactions* for 1666 is published an account of Robert Boyle's "new kind of baroscope, which may be called statical," a balance carrying at one end a hermetically sealed and comparatively light glass sphere, and at the other a metal counterpoise. As the mass of air inside the sphere remained constant and the surface area was much greater than that of

the counterpoise, changes in the pressure of the surrounding air caused the sphere to rise and fall. The angular deviations of the balance were read by a dial and index. A balance barometer similar in principle was devised more than two centuries later by Heller, who published a description of it in the *Philosophical Transactions* for 1871. His "barometer without mercury" consists of a scale beam to the ends of which are fixed two bodies nearly equal in weight but differing greatly in volume; one a hollow sphere and the other a solid cylinder.

The efforts of many early inventors were devoted to the problem of giving the barometer a more open scale, so that slight changes of pressure could be more readily measured. One plan for accomplishing this, proposed by Descartes, was carried out by Huyghens, who enlarged the part of the tube about the top of the mercurial column and attached a supplementary tube extending upwards and containing water, the motion of the surface of which in the added tube magnified the variations of atmospheric pressure. Hooke, in 1685, and De la Hire, in 1690, introduced improved instruments in which light liquids were similarly used above the mercury, and the same idea has been embodied in some modern barometers.

Another device for magnifying the movements of the mercury was the diagonal barometer, in which the upper part of the tube is bent at a large angle to the vertical. The invention of this instrument is generally attributed to Sir Samuel Morland (died 1695), though, according to Poggendorff, he was anticipated by B. Ramazzini, of Modena. Morland also devised a form of balance barometer, in which the tube suspended from one end of a balance or steel yard floated in a fixed cistern, the other end of the beam indicating the barometric variations.

A further device for increasing the scale, known as the rectangular barometer, was suggested by Cassini and subsequently described (in 1710) by Jean Bernouilli. In this device the upper closed end of the tube acted as the cistern, and the lower end was extended as a narrow horizontal tube open at the end to the air. The small bore of the horizontal tube magnified the movements of the mercury along it.

The first effort to indicate the height of the mercurial column with accuracy was due to William Derham, who, in 1698, proposed to use "a fine finger," pointing out the height of the mercury, attached to a rack, which, through a pinion, caused a hand to move around a circular graduated dial. A micrometer device for reading the barometer was proposed in the same year by Gray.

Amontons devised, in 1688, a barometer of diminished height, compared with those previously in use. The pressure of the atmosphere was sustained by the mercury contained in a succession of two or more syphons, the lower part of one siphon being carried by an intermediate tube to the upper portion of the next, the connecting portions containing air. A similar device has been ascribed to Fahrenheit. Amontons also invented the conical barometer. This consisted of a vertical tube, increasing very gradually in diameter from the top downward. The top was closed and the bottom was open to the air, which supported the mercury at a certain height. When the atmospheric pressure diminished, the mercurial column descended, but on account of occupying a broader part of the tube, its total length decreased. The varying length of the column thus served as a measure of atmospheric pressure, instead of the varying height of the top of the column above a fixed point, as in an ordinary barometer.

Hooke's marine barometer, introduced before 1700, consisted of two instruments: an air thermometer, on which pressure and temperature both acted, and a sealed thermometer, affected by temperature alone. Comparative readings of the two showed the changes in atmospheric pressure. The same principle has been used in more recent times in the construction of "sympiesometers," the first of which was introduced by Adie in 1818.

In 1695 Daniel Quare, an English clockmaker, patented a barometer in which, by means of a screw acting upon a leather pad below the cistern, the mercury could be forced up the tube and the instrument thus rendered portable. A similar device was used for the same purpose in the barometers of Sisson, Bourbon and Desaguliers, all of the eighteenth century. Finally, about 1810, the Paris artist Fortin designed the well-known type of barometer cistern in which, besides a screw for raising and lowering the level of the mecury, in order to get rid of the "capacity correction," there is a fixed ivory point corresponding to the zero of the scale.

The process of boiling the mecury for use in a barometer in order to free it from air is mentioned by Beighton in the *Philosophical Transactions* for 1738, who described it as then employed by Charles Orme.

Gay Lussac's siphon barometer was first described in the *Annales de Chimie* for 1816. In order to make this instrument portable, the lower part of the principal tube was contracted to capillary size, and the hole at the end of the short branch, affording access to the outside air, was so small that mercury would not escape through it except under great pressure.

The important improvement known as the "airtrap," or "pipette," designed to prevent air from entering the barometer and rising to the space above the mercury, was devised by Bunten, of Paris, in 1824. This consists of a tube, tapering downward to a small orifice, placed within the main tube of the barometer. If bubbles of air get into the lower part of the mercurial column they rise around the slender tip of the trap and are stopped at the junction of the latter with the main tube.

Newman, in 1824, introduced the idea of fixing a therometer with its bulb in the barometer cistern in order to ascertain the temperature of the mercury. The "attached thermometer" of the modern barometer is placed part way up the column, with its bulb between the metal case and the barometer tube proper.

Many barometers have been constructed in which, instead of mercury, liquids of less specific gravity have been employed. Pascal set up a water barometer 46 feet high at Rouen in 1646. Luke Howard used linseed oil in a siphon barometer in 1801. In 1830 Daniell constructed the well-known water barometer of the Royal Society, describing all the operations with great detail in the *Philosophical Transactions* for 1832. It was filled by boiling distilled water, which was forced up the tube by the pressure of steam in the boiler. The tube being sealed, the boiler then became the cistern, in which the water was covered to a depth of half an inch with castor oil to cut off communication with the atmosphere. This barometer gradually deteriorated until it was found to read seven inches of the water scale too low. It was destroyed in the fire at the Crystal Palace, Sydenham. J. B. Jordan constructed a glycerine barometer as early as 1873, and made one for Kew Observatory in 1894. A huge barometer filled with olive oil was one of the features of the exposition organized in memory of Toricelli, at Faenza, in 1908.

The history of metallic barometers may be said to begin with an instrument devised by Zaiher in 1758 for use at sea. This consisted of a hollow cylinder, exhausted of air, with movable ends, which were kept apart by an internal spring. When the pressure of the air increased, the ends would approach; when it diminished they would separate. Of modern metallic barometers, the most familiar is the common aneroid, with its numerous variations. A crude instrument embodying the principle of the aneroid was invented by Conté in the year 1795. The first instrument in the modern form was constructed in London in 1843, in accordance with the designs of the French inventor Lucien Vidie (who sometimes spelled his name "Vidi," the spelling now generally found in reference books). This style of barometer consists of a thin-walled metal vacuum-box, which changes its shape with changes in barometric pressure, and communicates its movements, by levers, to an index.

Improvements have since been made in aneroid barometers by several inventors, including the addition of a temperature compensation bar and the substitution of a laminated steel spring for the old form with spiral spring. Rush, in 1851, added an altitude scale, while Loseby, in 1860, and Goldschmidt, in 1870, dispensed with the ordinary gearing, the motion being multiplied by a fine micrometer screw which operated an index hand. Field, in 1873, by an ingenious shift of the altitude scale, accommodated the instrument to different temperatures for altitude work. The Bourdon form of metallic barometer, devised in 1851, is quite different from aneroids of the Vidie type. It consists of a thin elastic metal tube of elliptic section, bent in a curve, and exhausted of air. The curvature of the tube varies with pressure and its variations are communicated by gearing to an index.

A recording barometer was designed by Beaudoux in 1777. It consisted of a siphon barometer attached to a semi-circular balance beam carrying a pencil, which traced a continuous record on a traveling sheet of paper. This arrangement was modified in 1780 by Changeux, who arranged the recording pencil to be left free, and to be

struck by a hammer at definite times. A similar plan was adopted by Kreil, 1841, Bryson, 1844, and others. Barometers with photographic registration were introduced by Jordan in 1838, and by Brooke and Ronalds in 1847. Wheatstone, in 1842, suggested that platinum wire should make contact with the mercury in the tube of a barometer, thus creating an electric current which should be utilized to record at intervals the instrumental variations. Many other electrically recording barometers have been introduced, and there is an equally long list in which registration is purely mechanical.

Several recording barometers, or barographs, are adaptations of Morland's balance barometer, already mentioned. In some of them the cistern is fixed and the tube is carried by the beam, which actuates the recording point; in others the tube is fixed and the cistern is attached to the beam. The first modern barometer on this principle was made by King, of Liverpool, in 1853; others have been devised by Secchi, Wild, Schreiber, Crova and Cecci.

All the recording barometers above mentioned are mercurial. A recording aneroid barometer, described by Hipp in 1871, made a pencil record at intervals of ten minutes on a moving sheet of paper. The nearly universal type of aneroid barograph of the present day traces its record continuously in ink on a sheet of paper wound around a metal cylinder, which is turned by clockwork.

Instruments for recording minute variations in atmospheric pressure are called "microbarographs." The earliest of these was the differential microbarograph of Whitehouse, introduced in 1871. A greatly improved instrument was devised by Shaw and Dines in 1903. It consists of a closed metal cylinder containing air at approximately atmospheric pressure, provided with a mechanical arrangement by which the variations in the difference of the pressures inside and out are recorded. In W. Schmidt's "variograph" (1909), fluctuations of atmospheric pressure affect the height of a gas flame and hence its temperature; the latter is registered continuously by a pen.

The various instruments known as "statoscopes" show small fluctuations in atmospheric pressure, usually without recording apparatus. They are designed chiefly for the use of aëronauts, who use them to observe changes of altitude during their flights. A common form of statoscope consists of a sensitive metal diaphragm exposed on the outside to the changes of atmospheric pressure, and connecting on the inside with a closed reservoir protected from changes of temperature by non-conducting walls. As the pressure of the enclosed air remains constant, the diaphragm responds to changes in the pressure of the air without, and its movements are communicated to an index needle moving around a dial, or, in some cases, tracing a record on a moving sheet of paper. The statoscope is set to zero of the scale at the beginning of the observation by opening a stopcock which admits air to the reservoir, thus equalizing the pressure on both sides of the diaphragm, after which the stopcock is closed.

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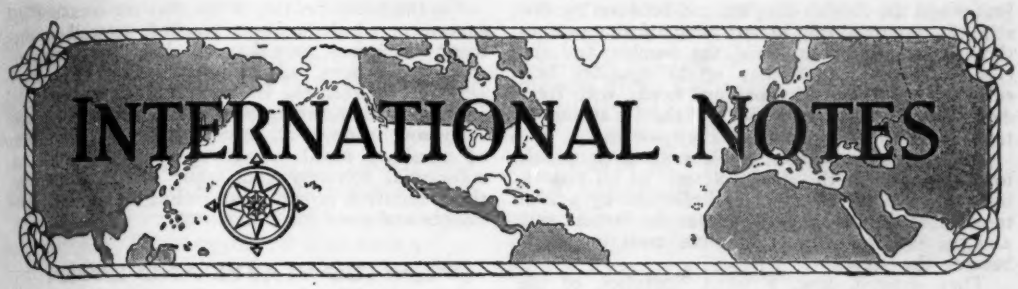

FROM AUGUST 1 TO SEPTEMBER 1

PREPARED BY PROFESSOR ALLAN WESTCOTT, U. S. NAVAL ACADEMY

FAILURE OF NAVAL CONFERENCE

CONFERENCE ENDS AUGUST 4.—The Tri-Power Conference for Limitation of Naval Armament called by President Coolidge ended in failure at the plenary session held August 4. A suggestion was made by Viscount Cecil that a treaty be prepared covering points in which "a large measure of agreement had already been reached," but this proposal was not approved. In final speeches the heads of each delegation restated the positions taken by their several countries. Mr. Gibson in his closing address stressed the objections to the British proposals, and declared that present world conditions did not warrant the British requirement of 647,000 tons of auxiliary surface craft as against the 450,000 tons which, he said, had been found acceptable at the time of the Washington Conference.

Upon his return from the conference Admiral Jones declared his belief that little progress toward disarmament could be made by conferences. The conference, he thought, had done good by calling attention to the requirements of our Navy and emphasizing the importance of our foreign commerce and the need of an adequate Merchant Marine. "It is recognized," he said, "after all is said and done, that the United States is an island empire and, just as any other great industrialist nation, must depend for its prosperity on sea communication. I think this conference has done much to turn the eyes of our people toward the sea and to show what the sea means to the continued prosperity of the United States. At least I hope so. What we also need is an adequate commercial fleet which would act as an arm to our Navy. We need a fleet to take our goods to foreign countries and to return with foreign goods."

Asked if he thought there would be another naval armament limitation conference, Admiral Jones said: "I think that if they have another preparatory commission, the probability is that we will be in it and I think the United States will take part in any future conference."

JOINT STATEMENT OF DELEGATES.—The text of the joint statement approved by the United States, British and Japanese delegates at the final session of the conference is as follows:

In pursuance of the suggestion of the President of the United States, the plenipotentiary delegates of the President of the United States, his Britannic Majesty and of his Majesty the Emperor of Japan, met at Geneva on June 20 to consider the limitation of auxiliary naval craft.

Meetings have been held from that date until the fourth of August, during which period the delegates and their advisers have considered in detail various methods of attaining this object.

On many important questions provisional agreements have been reached, certain of which are embodied in the annexed report of the technical committee of the conference. These points of agreement relate particularly to the limitation of destroyers and submarines, and it was only when the conference took up the question of limitation of the cruiser class that difficulties were encountered.

These difficulties proved to be of a character to render it desirable to adjourn the present negotiations until the respective Governments have had an opportunity to give further consideration to the problem and to the various methods which have been suggested for its solution.

The American delegates presented the view that within total tonnage, limitations (maximum), initially suggested, should be between 250,000 and 300,000 tons in the cruiser class for the United

States and the British Empire, and between 150,000 and 180,000 tons for Japan; each of the powers should have liberty to build the number and the type of vessel which they might consider best suited to their respective national needs, with freedom, subject to limitation of the Washington treaty, to arm these vessels as they saw fit.

The British delegates, while putting proposals to a limitation of the size of vessels of all classes, have opposed the principle of limitation by a total tonnage alone on the ground that the largest ship and the heaviest gun permissible must inevitably become the standard.

They desired, first, a strict limitation of the number of 10,000-ton 8-inch gun cruisers, and, secondly, the establishment of a secondary type of cruiser to a maximum caliber of six inches.

The British delegates contended that the establishment of this type alone would enable the British Empire, within a moderate figure of total tonnage, to attain the numbers which it regards as indispensable to meet its special circumstances and its special needs.

The Japanese delegates presented the view that low total tonnage levels should be fixed which would effect a real limitation of auxiliary naval vessels. As for the question of the 8-inch gun cruisers, while the Japanese Government could not agree to any restriction as a matter of principle, they had no difficulty in declaring that, provided a tonnage level of 315,000 tons for auxiliary surface vessels were fixed for Japan, they would not build any further 8-inch gun cruisers until 1936, except those already authorized in existing programs.

Various methods were considered of reconciling the divergent views indicated above, but while material progress has been made and the points of divergence reduced, no mutually acceptable plan has been found to reconcile the claim of the British delegates for numbers of vessels, for the most part armed with 6-inch guns, with the desire of the American delegates for the lowest possible total tonnage limitation with freedom of armament within such limitation, subject to the restriction as to armament already set by the Washington treaty.

Faced with this difficulty, the delegates have deemed it wise to adjourn the present conference with this frank statement of their respective views, and to submit the problem for the further consideration of their Governments, in the hope that consultation between them may lead to an early solution.

Further, the delegates are free to recommend to their respective Governments the desirability of arranging between the signatories of the Washington treaty that the conference to be called pursuant to Paragraph 2 of Article XXI of that treaty should be held earlier than August, 1931, the date contemplated under the terms of that instrument, in order that any decision reached by such a conference may come into force before the capital ship construction program commences, namely, in November of that year.

In making these recommendations and in submitting this statement of the points of agreement as well as of the points on which agreement has not yet been achieved, the delegates desire to place on record a statement of their conviction that the obstacles that have been encountered should not be accepted as terminating the effort to bring about a further limitation of naval armament.

On the contrary, they trust that the measure of agreement which has been reached, as well as the work which has been done in clarifying their respective positions, will make it possible, after consultation between the Governments, to find a basis for reconciling divergent views and lead to the early conclusion of an agreement for the limitation of auxiliary naval vessels which will permit of substantial economy and, while safeguarding national security, promote the feeling of mutual confidence and good understanding.

UNITED STATES AND LATIN AMERICA

Marines in Nicaragua.—Brigadier General Logan Feland, who has been at the head of the marine force in Nicaragua, left on August 24 to resume command of the marine base at Quantico. The marines in Nicaragua at that time had been reduced to about 1,500, under Colonel Louis M. Gulick. In a dispatch on August 23, Admiral Sellers stated that the pacification crisis was past and conditions were improving, with only small bands of brigands unsubdued. Arrangements were under way for the surrender of General Sandino. On August 16 American marines and native constabulary killed two brigands in Northern Nicaragua.

Mexican Claims Convention Extended.—By an agreement signed in Washington on August 16, the life of the General Claims Convention between the United States and Mexico was extended for two years. The convention, which covers claims, not due to revolutionary acts, as far back as 1868, has had submitted to it 2,448 American and 796 Mexican claims, of which it has decided fifty-one of American and nine of Mexican origin. The agreement extending the convention permits consideration of all claims filed up to August 30 of this year. Claims for losses due to revolutionary activities are submitted to a Special Claims Convention which continues until 1929, though active sessions have for some time been in abeyance.

ENGLAND AND THE COMMONWEALTH

New Election in Irish Free State.—On August 25 the Cosgrave ministry in the Irish Free State surprised its opponents by dissolving Parliament and calling new elections for September 15. The ministry declared that the purpose of this move was to put clearly before the people the choice

between the Cosgrave and an opposition government.

In order to bring about the downfall of the Cosgrave cabinet, the forty-five Fianna Fail delegates, headed by Eamon de Valera, who had hitherto refused to take the oath of allegiance, did so on August 12 and took their seats in the Dail, declaring that they "proposed to regard the oath as an empty formality." On August 16 a motion of no confidence was beaten by a bare majority of one, the speaker casting the deciding ballot and one Nationalist (Redmondite) member abstaining from voting. The Dail then adjourned until October 11. Subsequently the Cosgrave forces won two seats in by-elections, but the position of the government was still insecure, and the call for a new election was taken as a shrewd move to prevent defeat. Most of the Fianna Fail funds, largely secured in America, were, it is said, spent in the last election, whereas the government party has strong support from conservative and industrial elements in Ireland. The Sinn Fein party, which elected five members in the last parliament, decided not to take part in the new election owing to lack of funds.

VISCOUNT CECIL QUITS BRITISH CABINET.—Owing to dissatisfaction with the policy of the Baldwin Government, especially in relation to the Geneva Naval Conference, at which he was a delegate, Viscount Robert Cecil, on August 30, resigned from his position in the British Ministry, and also stated that he would not attend the September League of Nations Assembly as one of the British delegates. "On the broad policy of disarmament," Lord Cecil wrote, "the majority of the cabinet and I are not agreed. I believe that general reduction and limitation of armaments are essential for the peace of the world, and on that peace depends not only the existence of the British Empire but even European civilization itself."

FRANCE

FRANCO-GERMAN TRADE AGREEMENT.—The Treaty of Commerce between Germany and France, which has been under negotiation for many months, was finally signed in Paris on August 17. The chief bargaining over the treaty was for the purpose of securing favorable tariff rates for French surplus agricultural products, such as wine, in exchange for tariff concessions on chemical, electrical, optical, and other manufactured imports from Germany. According to the terms of the treaty, after 1928 Germany will obtain "most-favored-nation" rates on all exports to France. Germany also secures full trading rights in Morocco and other French protectorates and colonies, but without the privilege of residence in Morocco for German nationals.

It is expected that the tariffs fixed in the treaty on German imports to France will soon be applied also to American imports, which at present have a somewhat lower rate.

RED RIOTS IN PARIS.—During the period of the Sacco-Vanzetti executions, communist riots and demonstrations occurred in Paris on a scale not equalled since before the war. Hundreds were arrested, and many were injured in the rioting, including 121 police in the fighting on August 23. As in other European cities, American official buildings were heavily guarded.

SOVIET REPUBLIC

TROTSKY GROUP WIN VOICE IN PARTY.—At the plenary session of the Communist Central Committee held in Moscow during the first ten days of August, the Bolshevist opposition headed by Trotsky and Zinorieff not only escaped expulsion from the committee but, after being "admonished" in a 5,000-word resolution, actually secured the right to publish their news in the official newspaper *Pravda* from October 15 up to the assembling of the Communist Party Congress on December 1. Writing in the New York *Times*, the correspondent, Walter Duranty, explained the compromise as a concession to popular sentiment, and declared that the party had emerged from the crisis stronger than before.

RUSSO-PERSIAN COMMERCIAL TREATY.—It was reported in August that after six months' negotiations a commercial treaty had been agreed upon between the Soviet Government and Persia. Owing to the excess of Persian imports into Russia over exports to Persia, drastic cuts in the former have been made by the Soviet régime. The present treaty provides for imports and exports amounting to 25,000,000 rubles, but

grants certain further concessions to Persian exports, and permits transit of Persian goods through Russia to Western Europe without taxation.

CHINA

Fall of Chiang Kai-shek.—On August 15 came the surprising news of the resignation of Chiang Kai-shek as commander-in-chief of the Nanking revolutionary forces and from all other posts in the Kuomintang or Nationalist party. Chiang went into seclusion in his native village. His resignation was accompanied by that of several other officials and the practical collapse of the Nanking Government. The fall of Chiang appears to have resulted primarily from a series of severe reverses inflicted upon the Nationalist forces by Sun Chuan-fang, the former Shanghai war-lord, in the fighting north of Nanking along the Pukow-Tientsin railway. Sun's forces showed complete regeneration since their defeat last March. At the close of August they had recrossed the Yangtse at several points and were closing in on Shanghai. Firing on foreign naval vessels by Southern troops increased as a result of the resumption of hostilities along the river.

Chiang's own statement attributed his resignation to a suggestion from General Feng Yu-siang that the Nanking Government relinquish power in favor of Hankow, along with the threats of the Hankow Government and the reverses on the Shantung front. He ended with an appeal to the Hankow officials to go to Nanking, consolidate the two governments, and continue the campaign against the Northerners.

Peking Premier Broaches Treaty Revision.—With the disorganization of the Nanking Government and the success of General Sun Chuan-fang's advance into the Nanking and Shanghai areas, Premier Pan Fu of the Peking Government again raised the question of treaty revision by negotiation between the powers and the government at Peking. He declared that Marshal Chang Tso-lin's government was the only really effective authority in China today, and that the powers would do well to open treaty revision parleys in order to swing popular sentiment in favor of the Northern forces.

INTERNATIONAL CONFERENCES AND DISCUSSIONS

Williamstown Institute of Politics.—The seventh annual session of the Williams College Institute of Politics ended on August 25 after a month of lectures, conferences, and round table discussions. Among the general topics taken up were Inter-Allied Debts, European Dictatorships, Latin-American Problems, the Philippines, China, the British Commonwealths, and American Agricultural Problems. Sir Arthur Willert, head of the news section of the British Foreign Office, gave a series of lectures on British Foreign Policy. Summary of the conferences is difficult since the discussions aimed not so much to lead to definite conclusions as to give free opportunity for expression of divergent opinions. Professor Quigley, of the University of Minnesota, head of the Round Table on China, in summing up the discussions in that field, expressed the belief that China would evolve along lines of a gradual federation (New York *Times*, August 25).

"The process," he said, "is certain to be slow and it affords no materials for present policy except a counsel of confidence for the future.

"It is likely to be true that Federalism for China will take the form of regionalism. That has been the recent tendency of Federalism in the United States and it would be advantageous to have it take that path in China from the beginning. If it does, unnatural political and economic lines will be broken down, leaving the people of large areas with similar interests and a logical center of activities free to work out common problems.

"Chinese provinces have been for centuries inclined to group themselves into regions, a tendency which better communications will accentuate. From the political angle the recognition of regions rather than provinces as units would reduce somewhat the number of authorities to be considered for representation in the control Government. It would also reduce the cost of government.

"This consideration leads naturally to another; that for the present all that can be envisaged are a number of regions of varying size and types of political control which are conscious of each other's existence but which are related to each other in no way

beyond the common membership in the Chinese State, itself defined in a constitution at present inoperative. One region recognizes another only for the sake of an alliance or when seeking to absorb it by conquest. Such a situation is not federalism; it might be termed unconscious confederation. The next state, it may be anticipated, will be true confederation, to be followed subsequently by the pooling of common interests in a Federal State."

INTERPARLIAMENTARY UNION.—The Twenty-fifth Congress of the Interparliamentary Union met in Paris on August 25. Thirty-five countries were represented by about 400 delegates, including twenty from the United States with ex-Senator Theodore E. Burton as head of the delegation. Arbitration, limitation of armament, tariff revision downward, and codification of international law were among the subjects scheduled for reports and discussion.

CASES BEFORE THE WORLD COURT.—Bulletin No. 4 (August 10) on Foreign Relations, issued by the so-called "American Foundation" maintaining the American Peace Award, lists the cases now pending before the World Court. These are five in number, as follows: (1) between France and Turkey over the collision of the French steamer *Lotus* with a Turkish collier and the subsequent arrest and imprisonment of a French officer of the *Lotus;* (2) between Germany and Poland over a German-owned nitrate plant in territory now Polish; (3) between Belgium and China over the legitimacy of the Chinese denunciation of the Chino-Belgian commercial treaty; (4) between Greece and Great Britain over the concession of a Greek citizen in Palestine; (5) between Great Britain, France, Italy, and Rumania as to whether the control of the Danube by the European Commission extends between Galatz and Braila on the same terms as below.

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FIVE YEARS IN TURKEY.

By General of Cavalry Liman von Sanders, German Army. Translated by Colonel Carl Reichman, U. S. Army, (Retired). U. S. Naval Institute. 340 pages. $3.50 postpaid.

REVIEWED BY CAPTAIN W. D. PULESTON, *U. S. Navy*

To all who are interested in the reactions between policy and strategy, in the relations between statesmen, sailors, and soldiers, and in the effect the character of a government has on its method of making war, the part played by Turkey in the World War will appeal. Fortunately for them, Turkey lay at one end of the European battle line and this position with her natural boundaries makes it easy to isolate her part in the war for purposes of study without losing its effect on the main combat. And it is their further good fortune that General Liman von Sanders, in charge of the German Military Mission in Turkey from 1913 to 1918, kept a notebook during that eventful period.

The conclusion of the First Balkan War in 1913 found Turkey badly defeated. Bereft of European Turkey, including Adrianople, she had scarcely room in Europe to circumvalate Constantinople. The outcome of the first war also lowered the prestige of the Dual Alliance, which accordingly encouraged Rumania to intervene and thus helped to bring on the Second Balkan War in 1913, during which Turkey regained Adrianople and a European rampart for Constantinople.

In December, 1913, von Sanders undertook the difficult task of reorganizing the Turkish Army and from that time until the fall of 1918 he was in charge of the German Military Mission to Turkey. His *Five Years in Turkey* describes this eventful period. He wrote while a prisoner at Malta in 1919 from notes made from time to time during this period. When writing he did not have access to much information now generally known but even better than the Turks themselves, he knew the strength and the weakness of their army, and while his foreign origin doubtless handicapped him in some respects, his detachment from the internal intrigues which plagued Turkey increased his prestige and position as a soldier and his previous experience in Germany gave him a broader perspective as a writer. The reader should continually remember that von Sanders wrote with only the knowledge available to the High Command of the Central Powers.

On his arrival in Turkey in 1913, he was also given command of the Turkish Army in Constantinople. This caused the Czar to complain to the Sultan, who with customary Turkish deftness changed von Sanders' title without diminishing his powers, thus placating the Czar and retaining the services of von Sanders. Emperor William desirous of pleasing Nicholas assisted in this

diplomatic pleasantry by promoting von Sanders whose increased rank was alleged as the reason for the formal change made in his command.

Governmental graft was a fine art in Turkey in 1914 and many obstacles had to be overcome by the Mission in rehabilitating the Turkish army. The Mission was established and supported by the despotic powers of Enver, Talaat and Djemal, the triumvirate who dominated Turkey. This notable trio scarcely secure in their high places could take no half-measures; so under Enver's lead they purged the army of all except Young Turks and after gaining sufficient time to enable them to mobilize leisurely cast Turkey's lot with the Central Powers. At this time Turkish public opinion probably favored her entrance in the war and it was easy to arouse enthusiasm in Constantinople by promising the populace to recover Egypt from Great Britain and Georgia from Russia. And thus it happened that Turkey badly defeated in 1913 by November 1914 was able to mobilize four strong armies. The best two, the First and the Second, she retained to defend Constantinople; the Third mustering 90,000 men, she launched at Russia in the Caucasus; the Fourth, mustering four divisions, she sent across the Syrian Desert to recover Egypt, while Constantinople shouted, "On to Cairo."

By February, 1915, both the Third and Fourth Armies had been repulsed and the Third reduced to impotence, while the Allies were beginning to threaten the Dardanelles. This lead to the formation of the Fifth Army under von Sanders, who as the world already knows, after desperate fighting, turned back the armies of Great Britain and France on Gallipoli and restored the prestige of the Turkish arms, lost in the Caucasus mountains and in the Syrian Desert. Von Sanders devotes two chapters to the struggle for Gallipoli, and while he admirably covers the large features of the campaign and furnishes a clearly drawn picture of the various situations he confronted on that peninsula the reading world will probably regret he did not give more details. His account is modest to a degree and he is clearly willing to leave his reputation to the future; nor does he gloss over his mistakes for he knew war too well to hope to wage an errorless campaign. Two of his comments on the Dardanelles campaign will provoke much interest. He credits the British with having better information of the Gallipoli terrain than the Turks and he minimizes the assistance given his Army by the German submarines. Neither side knew much of the details of Gallipoli Peninsula, but if the Turks knew less than the British they knew little indeed. Somewhat confirmatory of von Sanders' statement is an authoritative report that in planning the counter attack launched on August 10 against the British on Chunuk Bair, Mustapha Kemal did not know if its western approaches were precipitous.

If von Sanders could have realized the consternation caused by Hersing's submarine among the Allied Fleet, he would not have made the curious underestimate of the influence of submarines on the Dardanelles campaign. In his book von Sanders testified to the tremendous effect of the naval-artillery where it could reach, submarines reduced this support to very small proportions yet he thinks little was done by the submarines. This opinion von Sanders retained to the end, for on the visit of Emperor William to the battlefields of Gallipoli in October, 1917, he reaffirmed this belief in the presence of high German naval officials.

After the Gallipoli campaign von Sanders in addition to heading the Military Mission remained in command of the Fifth Army with headquarters at Panderma, the terminus of the Anatolian Railway on the Sea of Marmara. His army defended the front from Midia on the Black Sea to Adalia in Asia Minor, a coastline of about 1,200 miles. He had numerous disagreements with Enver, as might have been expected, and repeatedly resigned his command, only to have Enver or Emperor William refuse to accept it. Over these disputes the reader may perhaps smile but they occasioned unnecessary friction between the two most important men in Turkey, Enver and von Sanders. There seems to have been a German clique in Constantinople close enough to Enver and to the German Embassy to intrigue against von Sanders, and Enver when he did not wish to follow von Sanders' advice was usually able to quote one German military expert against another.

It was impossible for Enver and von Sanders to see alike: Enver was hot-headed and impetuous, with large views of the rehabilitation of Turkey and the recovery of

her lost provinces; he believed in his star and likened himself to Napoleon; the World War to him was Turkey's golden opportunity to become the Turkey of old, and he never paused to reconcile his intense desires with his available means. Von Sanders was the product of the German regular Army and Staff schools, deliberately bold but subjecting all military proposals to a thorough analysis, and seeking always to limit his objective to things practicable: the World War to him was a life and death struggle between Germany and the Allies, and though immersed in a Turkish environment, he never forgot that Germany's Western Front was the decisive point of the War.

During 1916, Turkey contributed troops generously to the Galician, Macedonian, and Rumanian fronts; von Sanders believed this was bad policy except in the case of the contingent sent to the Rumanian front because in his opinion the troops were needed in Turkey and he knew the Turkish soldier was more efficient fighting on Turkish soil than abroad. He was bold enough to advise the German High Command to this effect. According to von Sanders, Turkey contributed twenty-two divisions to her allies. These divisions were the pick of her Army and included the best equipped of her men. The method of selecting these army corps for the European fronts resulted in leaving only the poorer officers and troops to defend Turkey. It is creditable alike to von Sanders' honor and judgment that he continued to protest against sending Turkish troops from Turkey: he based his opposition on the sound reason that these troops were necessary to the defense of Turkey and an unbeaten Turkey was necessary to the Central Powers. In November, 1916, Ludendorff withdrew his request for two Turkish divisions previously promised him and thereafter Germany made no further demands on Turkey. In von Sanders' opinion the harm was already done and Turkey's too generous contribution to the Allies he considers one of the major causes of her sudden collapse in 1918.

Von Sanders pays a deserved tribute to von der Goltz who came from Belgium to reorganize the Turkish forces in Mesopotamia, and who died of cholera in Bagdad a few days before Townshend's surrender at Kut el Amara. The Turkish commander Izzet Pasha, who succeeded to command at von der Goltz's death, was a youthful uncle of Enver and his natural elation over the victory led to overconfidence and he detached an Army Corps to Persia as the first step against India. This corps was unable to return in time to oppose Maude's reënforced Army which captured Bagdad in 1916.

Von Sanders' book gives the broad outlines of the Turkish situation in Mesopotamia and should be compared with the British official account of the Mesopotamian campaign. He had no time to emphasize the dramatic features of the British-Turkish struggle for Mesopotamia centering around Bagdad, where the death of von der Goltz on the eve of his victory and of Maude on the morrow of the British capture of Bagdad occurred in the same building and of the same dread disease, as if that air, sacred to all Moslems, resented equally these Christian conquerors.

Some of the most useful features of von Sanders' book are the reports of the strength and disposition of the Turkish Army submitted from time to time by him to the German headquarters. Two very significant reports are those of October 25, 1916, and December 13, 1917. A comparison of these will show the effects of the heavy fighting by the Turks in the interval. The Caucasus region probably took the greatest toll of the Turks, the Third Army was wiped out twice and then the Second Army was sucked into and destroyed in this inhospitable region, and only the Russian revolution prevented the Russian Army from utterly destroying the Turkish Army and effecting a permanent junction with the British in Mesopotamia.

Throughout the book von Sanders laments the poor communications available in Turkey; in fact he attributes the collapse of the three offensives undertaken by Turkey in Caucasus, in Mesopotamia, and against Suez, to defective communications. At the same time, he is outspoken in his admiration for the stoical manner in which the Turkish soldier bore the consequent hardships, but even Anatolian peasants have limits of physical endurance and when supplies almost entirely failed they died in great numbers from undernourishment and towards the end of the war they deserted almost by battalions to avoid starvation.

Although Enver disliked von Sanders, in time of peril he was apt to send for his German colleague and so in 1917, when the

Turkish resources had been dissipated in Europe, Caucasus and Persia, Enver summoned von Sanders to turn back the British who were making preparations for the last advance through Palestine. Twice von Sanders turned them back at the Jordan but in the end the British prevailed. Had von Sanders realized at the time that the force sent to defeat him depleted Haig's army and assisted Ludendorff in breaking through and destroying the British Fifth Army, he would have been somewhat consoled. Lloyd George in England was as dispersive as Enver.

In the concluding chapters von Sanders gives a vivid and laconic description of the collapse of the Turkish position in Palestine in the fall of 1918, the subsequent rout of his army and the desperate but unavailing efforts he made to reorganize the remnants of this army. It was appropriate that in his last effort in defense of Turkey against the British advance he should have at his right hand the indomitable Mustapha Kemal, who actually reformed the First and Eleventh Turkish Divisions into the semblance of an Army Corps and formed the rear guard of the beaten and demoralized Palestine Army.

On October 30, 1918, von Sanders was directed by Grand Vizir Izzet Pasha to turn over his command to Mustapha Kemal. The end was near, and the principal characters soon went their various ways: Enver rode alone to an unknown death in the Caucasus where his patriotic, brave but undisciplined imagination had doomed so many of his countrymen; von Sanders to a temporary prison in Malta thence to Germany which he had faithfully served; to Mustapha Kemal was reserved a still greater task for which his training under von Sanders eminently fitted him and he redeemed much of his country from the disastrous effects of the World War. Since the Armistice he has shown the world that Turkey still possesses competent leaders and courageous soldiers and has postponed indefinitely the long predicted partition of his native land.

Those who worship the power of the silver bullets, who rely on organized industry to wage future wars, who think a high degree of western civilization guarantees victory in war, or that a democratic form of government is the only one that will endure, should take thought of the history of Turkey particularly since 1800 and they will find difficulty in reconciling their theories with Turkish annals.

The frankly cynical will find the European intrigues in Turkey amusing; those curious about the future of Europe will find that Constantinople, Turkey, and the Near East will still be the most reliable political barometer of Europe.

The author's style of writing is soldierly and the translator has preserved the author's simple language; some of the finer shades of thought perhaps never survive a lingual transplanting but a military author is fortunate in securing a military translator.

Little is known in this country of Turkey and her tremendous military capacity, and the large part she played in the World War. Thanks to the enterprise of the Naval Institute an authoritative book on Turkey's part in the War is now available to the English reading student. In the past we have depended on British translators to acquaint us with the numerous German treatises on war and fortunately British translators have served us ably. But it is time the United States contributed her share to translating and interpreting German military ideas to the English speaking world and in beginning with von Sanders' *Five Years in Turkey* the Naval Institute is making a splendid start which it is hoped will be the beginning of a series of translations which will give military students authentic accounts of the views of all Europe on the World War.

The Naval Historical Foundation

By Captain Dudley W. Knox, *U. S. Navy (Retired)*
Secretary, Naval Historical Foundation

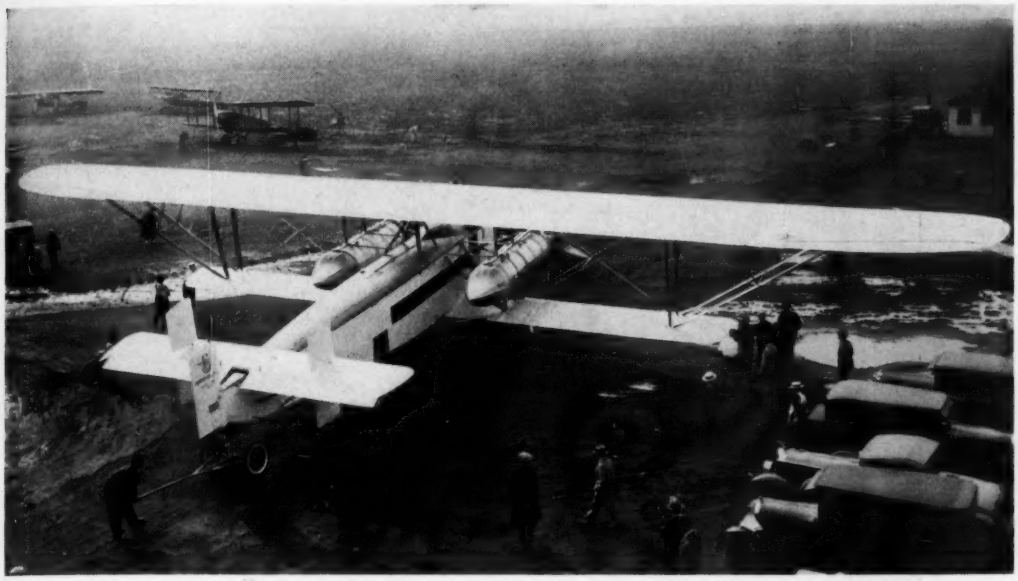
The Naval Historical Foundation is actively engaged in the collection and preservation of the sources of American naval and merchant marine history. During the last year it has added to its collection nearly 4,000 manuscript letters and reports, 400 books, and 150 old journals, besides a number of maps, pictures, newspapers and relics.

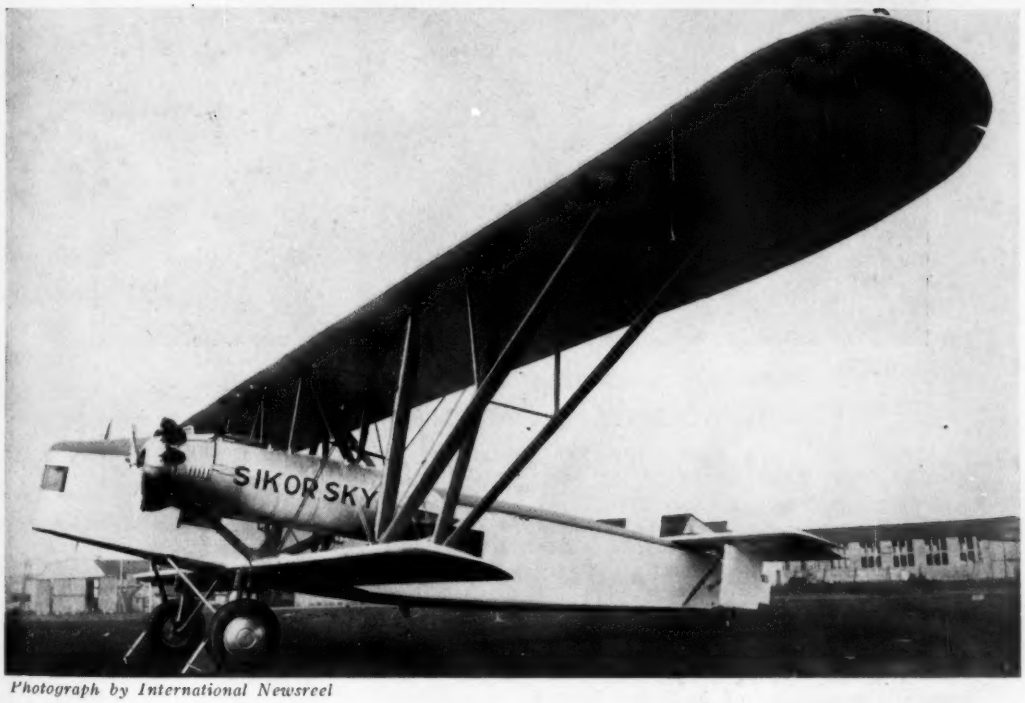
The Foundation was incorporated privately by the Secretary of the Navy and several historians, naval officers, and marine officers, with the object of rescuing from oblivion and probable loss or destruction the great quantity of source material of naval history which is badly scattered in private hands; more especially the records pertaining to our earlier wars when governmental archive functions and facilities were virtually nonexistent. The concentration of such material into a few places is necessary before the cardinal influence of sea power upon history of the nation can become adequately known.

The Naval Institute has generously aided in the inception and progress of this work by money donations and by publicity. A few months ago its membership by an overwhelming majority voted to give to the Foundation annually the interest on $10,000 for a period of five years. The Trust Fund now amounts to $2,000, besides which the Foundation has a checking balance of nearly $500.

Donations or loans of naval or marine documents, pictures, books, and relics, will be gladly received and well cared for, as will contributions to the Trust Fund. A legal form of bequest is as follows: "I give, devise, and bequeath $..... to the Naval Historical Foundation, duly incorporated in the District of Columbia."

It is the expectation that space for the historical collection of the Foundation may be obtained in the new government archive building when completed. Mr. Brockholst Livingston, one of two hundred members of the Foundation, has met with considerable encouragement from his public advocacy of the establishment of a naval museum. Meantime the collection is placed in room 2728, Navy Department, Washington, the address of the Foundation.

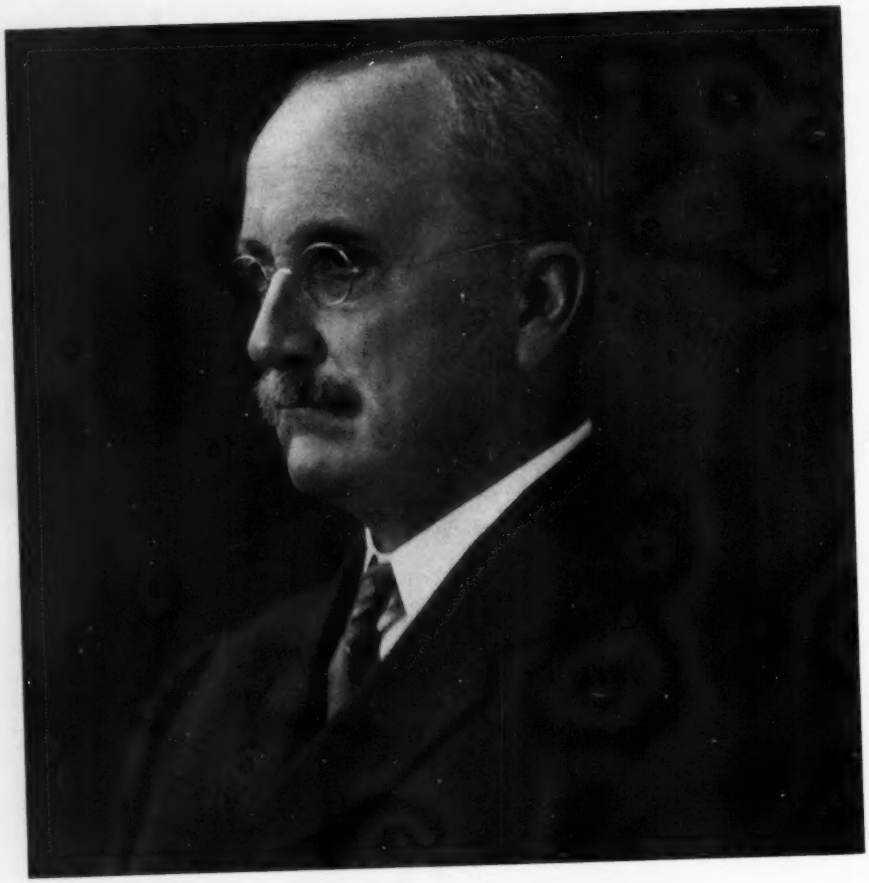




Photograph by International Newsreel

GENERAL VIEW OF THE NEW "SIKORSKY" PLANE READY FOR PRELIMINARY TESTS PREPARATORY TO THE NEW YORK TO PARIS AND RETURN FLIGHT. (FLIGHT DOUBTFUL AS WE GO TO PRESS.)

It is understood she was christened "Ville de Paris." Her pilots are the French war ace, Captain Rene Fonck and Lieutenant L. W. Curtin, U.S.N., the latter also acting as navigator. Ensign S. V. Edwards, U.S.N., will be radio engineer A fourth member of the crew, a mechanic, may be carried. The power plant consists of two radial Jupiter-Gnome-Rhone engines each of nine cylinders with 500 H.P. Each engine has a lubricating tank of 50 gallons and a fuel tank of 600 gallons directly in the rear. There is a reserve tank of 100 gallons in the center section of the top wing. The cruising radius is estimated at 5000 miles and once in the air it is estimated that one engine can keep the plane going at 70 per cent full load. The radio equipment consists of both long and short wave apparatus, the latter weighing but 18 lbs.; the plane's equipment thus permits a range of wave length from 17 to 14,000 metres. The top picture shows a trap door just below and abaft the windows. This door allows the wind driven radio generator to be housed inside the fuselage in case of sleet or ice forming on the generator propellers.



Distinguished Graduates in Civil Life—
Mr. William LeRoy Emmet

MR. EMMET was born in 1859, graduated in 1881, left service in 1883. He has worked in engineering since 1887 and, since 1892, has been an engineer for the General Electric Company. His engineering work can be roughly divided into four extended campaigns. The first of these was connected with the promotion and development of the uses and designs of alternating current machinery, mainly in connection with the Central Station industry. The second was the development of the steam turbine industry from the basis of the inventions of Mr. C. G. Curtis. The third was the application of steam turbines to ships through the medium of electric drive and also of new types of mechanical gearing, and the fourth has been the invention, design and experimental development of the Emmet Mercury Vapor Process.

Among the new things which Mr. Emmet has invented, or originally developed, may be mentioned: Certain methods of four wire, three phase distribution which have had extensive use. Various regulators, compensators, relays, etc., for alternating systems. The principle of governor control essential to the successful operation of engine driven alternators in parallel. The oil switch,—its original conception, and types most extensively used. Varnished cambric insulation and varnished cambric cable. Mica tape coil insulation. Many types and details in the original production of large alternating current apparatus which have long survived. The vertical shaft steam turbine and many turbine methods and details. The original conception of electric ship propulsion by the methods which have been extensively used. Various features in connection with gearing and geared ship propulsion. The Emmet Mercury Vapor Process and most of the details of design and invention which have made up its development.

SECRETARY'S NOTES

Special Information Number

The American people want, and in the long run will have, the kind of a Navy and Merchant Marine which to them seem best to meet their needs. The future of the Navy and the Merchant Marine, therefore, depends upon how clearly the American people can be made to see the need for them, and the place they fill, in peace as well as in war.

Recognition of that need does not by any means imply a spirit of aggression. That the American people will ever engage upon a war of aggression is now unthinkable, whatever size the Navy and the Merchant Marine may attain. War, even for defense, seems now remote.

The Navy's mission, therefore, lies not so much in readiness to resist attack, even though such readiness is vital to efficiency, as in the maintenance of peace.

A Navy equal to the best navy of any other country is not only a balance of power but a balance for peace. A Merchant Marine necessary for the transportation of our ocean-borne products is also a legitimate aspiration of the American people.

Following the custom of former years, the Board of Control of the United States Naval Institute has authorized this Special Information Number, commemorative of Navy Day, the anniversary of the birthday of Theodore Roosevelt. This year we feature Sea Power and its three links: Commerce, Merchant Marine, and the Navy. Vitally connected with our sea-borne commerce is the domestic transportation system, of which our railroads and their terminal equipment, ships and harbor facilities are of no small importance.

The Editor makes grateful acknowledgment to the steamship companies and railroads, which have so courteously furnished the illustrations for this issue of the PROCEEDINGS.

"Proceedings" on American Flag Steamships and Railroads

At the present time passengers on all of the passenger vessels flying the American flag and those on the "crack" trains of the Pennsylvania, Baltimore and Ohio, Santa Fe and Rock Island Lines, have available to them in the respective libraries or club cars the current copy of the United States Naval Institute PROCEEDINGS.

Admiral Jones Will Retire as Naval Institute's President Next February

The change made in the Constitution and By-laws of the Naval Institute at the Annual Meeting in 1924, which prevents a member from serving as president for more than two consecutive years, will automatically cause this year's Nominating Committee to leave that officer's name off the ballot for next year's elective officials of our organization. Admiral Jones has taken a deep interest in the affairs of the Institute and has been of great assistance to the Board of Control in the guidance of the major policies.

Due to detachment and orders to sea Lieutenant Commander W. G. Greenman has resigned as Associate Editor and Commander F. W. Rockwell has been selected to succeed him in the preparation of "Professional Notes."

Annual Dues—Membership—Finances

The bills for current dues will be sent out this year about November 1, so as not to inconvenience our members with the flood of other similar papers reaching them about Christmas time—this arrangement will be good for you and for your Institute. With the bills will be a stamped addressed envelope so all you will have to do will be write your check and check off on the enclosed forms and seal the envelope. You can, if you wish, pay several years in advance—we do not mind the extra bookkeeping if it serves your convenience.

Our membership is constantly growing—so is our advertising (increased more than $7,000 gross since January), and our financial affairs are in a flourishing condition. Our surplus is now over the $200,000 mark and we are on our way to the milestone representing a quarter of a million dollars.

Ask your shipmates and friends in civil life to join your organization—send us a list of the latters' names and addresses and we will communicate with them.

We are trying to make your organization as attractive as possible.

Make-up of the "Proceedings"—Illustrations

Some of our members have written in to say they like the illustrations, but suggest that they be distributed throughout the pages particularly through the articles to which they refer. This can only be done by using the same kind of paper throughout—a glazed paper that will take the photo engravings, and two reasons seem to prohibit this: First, the paper used for the textual pages seems the very best quality for reading, but it will not take the engravings: Second, while the enamel paper for the pictures is the best that can be obtained, the expense would be prohibitive as each picture would have to be an insert to go in by hand.

We have learned a lot about magazine make-up since January and the present PROCEEDINGS are costing some five or six thousand dollars a year less than at the beginning of the year.

The magazine might look better if bound with staples, but being sewed allows it to remain open more easily and is more convenient for reading. Stapling is less expensive than sewing.

So far this year we are better off financially, even with the illustrations and over thirty-five per cent more material published, than we were two or three years ago. We are making every effort to have our illustrations from the point of view of engravings, paper, ink and press work, equal to that of any magazine published.

We would still like to have suggestions.

Certificates of Membership Being Mailed

The new Certificates of Membership are being mailed as rapidly as our office force can do the work, and great care will be taken to see that each member's address is the latest one on our books. If not received by November please write.

It is hoped the members will be pleased with the handsome engraving by Caldwell of Philadelphia; when framed it will add to the attractiveness of your cabin or library.

The Language of the Sea

"Why don't you put a hint in the PROCEEDINGS," writes a contributor, "to the effect that we serve 'in' or 'on board of' a man-of-war, but never 'on' as Captain ———, Commander ———, and so many of the younger generation of naval officers express it? Another common error made by many writers on naval subjects now-a-days is to write "stand watch" instead of "keep watch"—the latter being correct as both you and I well know. Shades of good old Admiral Luce and others of his period! What must they think of the younger generation of naval writers?

"'The fathers have eaten sour grapes, and the children's *teeth are set on edge.*' 'Twould grate your ears; ——.'"

Navigation versus Aerial Navigation

One of the leading aviation magazines not long ago (we are charitable enough not to mention names) in an editorial referring to the transocean air flights made before the Dole Hawaiian flights, said these flights have "proved that air instruments have been developed that will enable men, who have never had a sextant in their hands, to navigate through the air as well as the most experienced naval navigator. Airmen have always asserted that air navigation is essentially a new art and one that is *easily learned by any pilot* [Secretary's italics]. Never again will the public believe that a seaman is required to fly an airplane over water."

It is inconceivable how a publisher and an editor of the magazine in question could be so ignorant of the vital principles of aërial navigation as to make the statement above quoted. Certainly no naval officer could make any impression in an attempt to explain the relations between navigation and (airmanship) seamanship. Colonel Lindbergh may do so and did, not only in his address to his brother airmen at the breakfast at Mayflower Hotel, Washington, last June, but also in his book *We*.

At the Mayflower, Lindbergh warned that the Hawaiian flight should not be undertaken unless a real navigator was taken—he carefully explained the difference between this flight and the trans-atlantic flight to strike a continent—he even said when asking the fishermen, "Which way is Ireland?" that upon sighting that country he was relieved to find that it "was not Spain or some other country."

In his book *We*, pages 201-203, he says that while his plane was being built in San Diego he "spent the greater part of the construction period working out the details of navigation and plotting the course, with its headings and variations, on the maps and charts. After working out the track on the gnomic and Mercator's charts, I checked over the entire distance from New York to Paris with the nautical tables. From New York to Paris I worked out a great circle, changing course every hundred miles or approximately every hour." He decided to dispense with the weight of a navigator, he said, to gain that weight of extra fuel because as the water gap he had to span, Newfoundland to Ireland, "was only about 1,850 miles, and under normal conditions I could have arrived on the coast of Europe over 300 miles off my course and still have had enough fuel remaining to reach Paris; or I might have struck the coast line as far north as Northern Scandinavia, or as far south as Southern Spain." It was for *this* reason, Lindbergh says, he believed the additional fuel would "be more important on this flight than the accuracy of celestial navigation." He also put his faith in an engine that did not fail him.

We still do not believe the editor of the magazine in question can "get it" and yet Lindbergh has never by word or deed given any evidence other than that he knows what he is talking about when it comes to piloting and navigating a plane anywhere.

While on this subject of aërial navigation the public has been told time and time again what a wonderful feat it was to navigate in the Pacific so as to "hit a tiny speck in the Pacific not over 300 miles wide." We have no comment other than to say if the weather is fair, visibility good, and celestial observations can be made, there is no more difficulty in a plane making a perfect "landfall" than is done every day by the surface ship as she picks up Diamond Head dead ahead. If weather conditions are foul, the landplane is up against it and no mistake—much more so than the surface ship, for it cannot slow, take soundings, stop or anchor.

Of course all the above is old stuff to our regular membership, but is gone into at length for the benefit of our large civilian associate membership who are interested, no doubt, as evidenced by popular interest shown by the press.

Flying in a Fog or With No Visibility—Weather Conditions

Can an experienced aviator fly in a fog or in complete darkness? and if so, for how long? The Secretary invites discussion of this question.

Of the British flight of the Smith Brothers from England to Australia, if the Secretary's memory is good, it was sometimes stated the pilots ran into fog on one portion of the voyage, which lasted so long the plane was flying upside down before the flyers discovered the fact. In the Alcock non-stop flight across the Atlantic the same thing was said to have occurred.

Experienced aviators of the Secretary's acquaintance say this is untrue but do say that every pilot fears fog more than anything else—that no pilot can fly very long in a fog in a plane of great maneuverability and keep a course. That the more skillful and experienced the pilot, the more stable aërodynamically the plane, the longer the plane can fly in a fog—but none of them will say definitely (or approximately) the number of hours a plane can fly in a dense fog, even with the present day instruments.

A careful reading of the accounts of the transatlantic flights does not disclose any great amount of *continued* consecutive flying in a dense fog or in *complete* darkness, although the popular accounts and headlines gave other impressions. First published accounts of Byrd's flight (not his own story) seemed to indicate that the *America* flew for nineteen hours in a fog but it was for this length of time that her crew saw neither *land* nor *water;* Byrd did see clouds below them from time to time and passed through them and the "valleys" between, and at night occasionally saw the stars. That they did see some *reference* points at not too greatly spaced intervals of time is the point. In the Atlantic the hours of darkness were less than six, except possibly for Nungesser and Coli, in case they came to grief in the Western Atlantic.

Lindbergh, in *We,* page 218, says "Even at this altitude (10,000 feet) there was a thick haze *(at the top of the storm clouds)* through which only the stars directly overhead could be seen. There was no moon and it was very dark. . . . . The moon appeared on the horizon after about two hours of darkness; then the flying was much less complicated. . . . . it was often necessary to fly through them *(the clouds),* navigating by instruments only. . . . . on several occasions it was necessary to fly by instrument for short periods; then the fog broke up into patches." These references to the weather are the most interesting part of his chapter on the transatlantic flight so far as naval officers are concerned, and extremely illuminating in view of events in the Pacific, and later in the Atlantic.

In the Dole Hawaiian flight, Jensen, winner of the second prize, tells how near he came to losing control of his plane in the darkness; and we have the last tragic SOS message of the *Dallas Spirit* in the night that "Bill's instrument board is in darkness, we are going

into a tail spin." What happened to Nungesser and Coli? What happened to the other two Hawaiian flight planes? What happened to the *St. Raphael, Sir John Carling,* and *Old Glory?* Could the pilots fly in a dense fog or complete darkness?

All but two of these flights were to the westward where the hours of darkness were longer than normal—and the pilots were not the night flying ones trained in the air mail service which has for its motto "Neither snow, nor rain, nor heat, nor gloom of night stays these couriers from the swift completion of their appointed rounds."

Even in the Air Mail Service, however, the pilots have the advantage of lighted airways and lights from cities, etc., "but being caught in a fog at night (when all vision is denied the pilot as in *complete* darkness) was the cause of two of my forced jumps," says Lindbergh in *We.* "The circumstances surrounding my fourth emergency parachute jump were almost similar to those," referred to above, he says, in that it was at night, bad visibility with sleet just turning to rain and Lindbergh "decided to leave the ship rather than attempt to land blindly."

In speaking of his service in the Air Mail, Lindbergh says "there are only two conditions which delay the air mail: fog and sleet. If the fog is light or local, and the sleet not too heavy, the planes continue even then. But when the ground becomes invisible and the fog covers the terminal fields, or when the sleet freezes thickly on wings and wires, the planes cannot continue."

In an article prepared by Lieutenants Ramsey and Kincaid, it was stated the weather conditions at the time Nungesser and Coli started their transatlantic flight were the best that any day in ten years had afforded, the authors citing Mr. Charles Mitchell, of the United States Weather Bureau, Washington, as their authority.

The only answers to unfavorable weather appear to be increased knowledge of meteorological conditions and better and additional instruments to lessen as much as possible these natural dangers.

The weather is still God made and man, notwithstanding his wonderful scientific attainments, is still unable to control it in any way—the problem of the *management of safely conducting a ship in a fluid from point to point is essentially the same whether the fluid be air or water*—and therein lies the relationship between the *seaman's* knowledge and that of the *navigator*—if the civilian pilot, the air mail pilot and the army aviator successfully and continuously handle their respective airplanes or dirigibles in this manner it can only mean that they are real seamen.

Getting the plane in the air, keeping her there and making the landing is a distinctly different art from unmooring or getting under way or docking a surface ship—the former is the technique of the aviator, the born artistry if you will, while the latter is that of the seaman.

The important point, however, is that just as the seaman may be of little use to the Navy unless specially trained, so is the aviator of little use to the Navy unless able to work with it under service conditions and speak its language.

"Peace on Earth Good Will to Men"

A great many honest people, even some of the pacifists, believe that the modern professional soldier and sailor is, of necessity, blood thirsty and a swash buckler, ever ready to propose increases in armaments, and chafing at the bits to try out his weapons and theories of war. He is ever accused of delighting to strut before his brother men in brilliant uniform of gold lace and trappings—and that, as his profession and liveli-

hood would be gone if war were done away with, he is naturally against disarmament. Hence his advice is not disinterested in that his salary depends upon his profession. As regards the latter little is said along the same lines about the $21,000,000 spent annually in this country by the pacifist organizations nor is attention but seldom called to the fact that college professors draw their retired pay from the Carnegie endowments. This is not to say that the recent outbursts from the professors on foreign debt cancellations, foreign policy and disarmament are in any way influenced by a desire to earn their future retired pay. This criticism would be as unjust, perhaps, as that leveled at the professional soldier and sailor.

The naval profession is, however, extremely practical—constantly running up against facts, not theories. Ever since the advent of Christianity, 2,000 years ago, mankind has tried continuously to do away with war as a solution of his problems. Upon the conclusion of each peace it has been thought possible to avoid a future war, still other wars have followed. It is not to be concluded from this that wars are just or even natural events in the progress of civilization—the arguments pro and con may be omitted—but the question may be asked: Is it wise at this time to act on the assumption that a peaceful solution will be found in the near future?

Willis Fletcher Johnson in Volume II, in the concluding chapter "War and Peace," in his *America's Foreign Relations,* sums up the question as follows:

"In the midst of peace we are in war. Or perhaps the converse is more apt. The closing years of the nineteenth century and the opening years of the twentieth conspicuously formed an era of wars; more marked than any that the world had known before for more than four score years. Europe had indeed suffered several important wars, though chiefly involving only four or five nations, and the United States had one gigantic civil war and one minor war. But this later era, within the space of a single generation, besides innumerable petty wars, saw great conflicts involving four continents and the islands of the sea, with a majority of the principal nations of the world as direct participants. There were the British war in Egypt and the Soudan, the war between China and Japan, between America and Spain, between Great Britain and the Boers, between Russia and Japan, the Boxer War in China, the two Balkan wars, civil war in Mexico, and the War of the Nations which seemed to cast the whole world into the melting pot. In the twenty-one years from 1894 to 1914 there were at least ten great wars, implicating twenty-three nations and their possessions in practically every quarter of the globe.

"Yet in no other period of the history of the world were agencies of peace, particularly for the permanent assurance of peace through the arbitration of disputes, so active, so energetic, and so profusely productive of proposals and treaties. In the course of a dozen years there were as many international irenic conventions as in the century before. The preceding century was, indeed, the first century of anything like arbitration in the present meaning of the term. . . . .

"Amidst this unprecedented profusion of irenic efforts, and probably in part because of them and as a counterblast against them, preparations for the world's greatest war were at first furtively and then openly pushed to completion. At midsummer (1914) of the very year in which so many peace treaties were being made, the storm broke. The United States was geographically and diplomatically remote from strife. Yet twentieth century civilization made, in war as in peace, all nations next door neighbors. The principles agreed upon at The Hague, to which agreement this country was a party, were ignored and violated, and the neutrality of this country was challenged and assailed more seri-

ously and more malignantly than it had before for a hundred years. At the very moment when we were commemorating the completion of a century of peace with the power with which our two chief foreign wars had been waged, we were made to realize, perhaps as never before, that universal peace was still a pious aspiration of the unmeasured future, and that our national security rested upon the self-same basis that had been wisely prescribed by the Father of His Country at the beginning of our national life. This cursory review of our foreign relations will have failed in its purpose if it does not convince us, with the arguments of a century and a half culminating in the transcendent emphasis of Armageddon, that—

"'Citizens by birth or choice of a common country, that country has a right to concentrate your affections. . . . . Nothing is more essential than that permanent, inveterate antipathies against particular nations, and passionate attachments for others, should be excluded. . . . . The great rule of conduct for us in regard to foreign nations, is, in extending our commercial relations, to have with them as little political connection as possible. . . . . It is our true policy to steer clear of permanent alliances with any portion of the foreign world. . . . . There can be no greater error than to expect or calculate upon real favors from nation to nation. . . . . To be prepared for war is one of the most effectual means of preserving peace.'"

"Red Pants" Captain Thomason of the Marine Corps has written a collection of stories, the first one giving the name *Red Pants* to his recently published book by Charles Scribner's Sons, price $2.50. In the *Red Pants* story "the hero is a magnificent Texas darky who, by a strange odyssey, now finds himself a warrior among the French Moroccans." This is the only story of the book wholly of the World War. "Luck" is a story partly of the World War and partly of the United States and one of the finest of the collection. Other stories have to do with life in the Caribbean aboard an American cruiser (the *Rochester* may be easily recognized), and of these "Mail Day" is the best.

DRAWN BY CAPTAIN JOHN W. THOMASON FOR "RED PANTS"

The author's *Fix Bayonets* has been acclaimed by every reviewer, and he has been ranked above Stephen Crane and the latter's *Red Badge of Courage,* but in *Red Pants* Captain Thomason shows himself "an imaginative artist."

The book, as was *Fix Bayonets,* is illustrated by the author who is an artist of no mean ability. We have reproduced one showing a marine on the fleet rifle range at Guantanamo, Cuba.

Both books show that the author knows his enlisted men ashore as well as afloat and referring to the latter *Red Pants* has much to tell us of what the marines are thinking and how they talk. The enlisted marines of today, as Thomason describes them, are not unlike those of twenty-five years ago, if the Secretary's memory serves him correctly, as life in a battleship's steerage for thirty-six months with "cabin" on the berth deck just

outside the marines' quarters was certainly an involuntary vantage point to hear "what the marines thought" in those days.

No one has ever done for a navy what Kipling has done for the British soldier, although Kipling has done well by the sailor. Scores have tried to paint the literary picture of our enlisted men of the Navy and have failed—Thomason comes nearer the picture of the Marine than anyone—the Bluejacket remains unpainted.

Color Blindness

Four out of every 100 males are color blind whereas only one out of every 1,000 members of the fair sex are so afflicted we are told by the medical fraternity. The figures are from an interesting paper on *Color Blindness* by Captain E. H. H. Old, (M.C.), U. S. Navy, printed in the *U. S. Naval Medical Bulletin*, Volume 25, No. 2 recently published.

We have long suspected the qualitative analysis but are not surprised at the quantitative results. The writer does not say so but a layman might venture the opinion that Mother Nature planned this biological difference, as far back as Wells' pre-historic age, to enable the female, in the struggle for the survival of the fittest, to differentiate the splendiferous colors with which the male bedecked himself as he strutted before her to attract her eye and favor. In modern times we all know to what use she makes of this favored natural endowment.

Captain Old points out, while color blindness has always been a subject of greatest importance to "those engaged in marine and railroad work," it is of even greater importance now because "today, with traffic signals of red, green, and yellow lights found practically everywhere, directing the ever increasing flow of vehicles, both day and night, and with a large majority instead of a small minority interested either as drivers or passengers, a great change has taken place, so that the color blind generally should be classed as potentially dangerous."

The new tests for color blindness show how defective the old tests were. Captain Old says that of 1,117 midshipmen recently examined (having previously passed the test at entrance examinations to the Naval Academy) thirty-three or 2.95 per cent were found deficient in the new tests by a board of six naval medical examiners.

It seems obvious that the examination for color blindness upon the entrance of a midshipman to the Academy or an individual to the commissioned grades of the Navy should be sufficiently rigid as to preclude his rejection at some subsequent period for this defect.

Legislative Method of Annexations of Texas and Hawaii

Our war with Mexico has been called a war of aggression by some, even Americans, but a reference to the history of the times will show that both political parties were strong in supporting our government and that Mexico really brought on the conflict. This latter statement may surprise some of our pacifists today and will certainly be news to quite a few of the so-called Latin-American experts in history. Our country is blessed with not a few of the latter who never miss an opportunity to impress their knowledge upon their fellow men, and some like Professor Scott Nearing, get a kick out of soap box oratory. Arthur M. Schlesinger, Professor of History in Harvard University, in his *A Political and Social History of the United States* 1829-1925, refers to this subject as follows:

Although the acquisition of Texas, with its results, was destined to intensify sectional antagonism in American Politics, [Editor's Note: He is referring to the slavery question], it should be noted that the action of the United States was fully justified in international law. Texas had maintained a separate

existence for *nine* [Editor's italics] years without any serious attempt on the part of Mexico to reconquer her. Moreover, her independence had been recognized by the leading European powers as well as the United States. On July 4, 1845, a Texas convention summoned for that purpose accepted annexation with only one dissenting vote, a decision later confirmed by popular referendum. At the next session of the American Congress, annexation was completed by the passage of a formal resolution admitting the State (December 29).

It is interesting to note here that there was no treaty which had to have the confirming action of the Senate's two-third vote, but Texas was annexed by the adoption of a resolution by a majority vote of the *two* houses of Congress. Many years later, in 1898, the same method was employed when Hawaii was annexed. For reasons of partisan politics in both instances, a two-thirds majority vote of the Senate could not be obtained—however a rose by any other name smells as sweet.

Williamstown Institute of Politics

One has only to read what is going on at the Williamstown Institute of Politics to appreciate why it has lost so much of its prestige these last three years. Certain internationalists have not been slow to seize upon the opportunity thus offered and it is doubtful if the originators of the Institute are yet aware of the "boring from within."

History of the World War As It Is Now Being Written

"War Fables Taught in American School" is the name of the leading article in the August number of *Current History* which starts off with the following statement:

There are 107 American school histories on file in the Congressional Library and National Bureau of Education. Not one has a correct account of the great troop movements and momentous situations of the World War. I know of no mitigating circumstances to plead in defense of those who have been guilty of making false, absurd and stupid statements in print and circulating them as American school histories.

In a section of the article headed "Other Serious Inaccuracies" the author takes to task J. H. Latané for his book *History of the United States*, which

has an interesting maneuver about the Argonne Forest which is contrary to the map of daily front lines and positions. He (Latané) states that the Americans would advance east of the forest until they outflanked the artillery and machine guns. This process was repeated again and again until the forest was cleared.

Interesting if true!

We cannot resist the temptation to recall to our readers this is the same Dr. J. H. Latané, Professor of History at Johns Hopkins University and expert on foreign affairs in the Caribbean that we called attention to in these columns several months ago and whom the Baltimore *Sun* quoted as saying that the United States was a "menace to the peace and prosperity of the world."

He is the one who rushed down to Washington to testify before the House Committee on Foreign Affairs and among other things testified that Admiral Fletcher landed men from the fleet at Vera Cruz because a personal salute *he* (Fletcher) demanded from the Mexican government was not forthcoming. We do not know if Admiral Mayo and Tampico ever heard of Latané or not, but it was evident the latter was not up on the facts in his expert testimony.

Why they do it is past all understanding—verily "Truth is stranger than fiction."

H. B. Goodwin, M.A., F.R.A.S.

Captain Armistead Rust, U. S. Navy (Retired) writes to the Secretary as follows:

"To the members of the United States Naval Institute who are particularly interested in navigation and nautical astronomy, the death of Mr. H. B. Goodwin, which occurred a few months ago, is great loss as it is to navigators the world over. For many years Mr. Goodwin contributed valuable and original articles to the PROCEEDINGS of the Institute, to *Brown's Nautical Magazine* and other similar publications; a collection of these would make a large volume.

"The following is a list of his principal works:

"*Azimuth Tables for the Higher Declinations.* (Limits of Declination 24° to 30°, both inclusive, of Latitude 0° to 60°). Extending the benefits of the azimuth tables to the moon and principal planets when situated without the solar limit of declination; and to a number of first and second magnitude stars.

"*Plane and Spherical Trigonometry.* Prepared by direction of the Lords Commissioners of the Admiralty for use in the Royal Navy. Eleven editions.

"*Navigation, Nautical Astronomy and Trigonometry.* Up to the standard of Board of Trade Examination for Second Mates, by William Roy. Revised, extended and brought up to date by H. B. Goodwin.

"*An Equatorial Azimuth Table.* A simple and universal method of finding the azimuth either by time or altitude azimuth, applicable in all latitudes to bodies of any declination, north or south.

"*The 'Ex-meridian,'* treated as a problem in dynamics, with a method of finding the reduction by means of tables in ordinary use. Also a short method of finding by inspection the time when a heavenly body has its maximum altitude, taking into account the speed of the ship.

"*Position Line Star Tables.* New and original methods of reduction to prime vertical, as well as meridian, without logarithmic calculation. Equally adapted to the Marcq Saint-Hilaire and ordinary Sumner methods.

"*A Companion to the Azimuth Tables.* Giving a general description of the azimuth problem, with deductions as to conditions favorable to particular methods. In addition to the azimuth a large amount of new and original matter connected with other branches of navigation is included in the work.

"*The Alpha, Beta, Gamma Navigation Tables.* These tables solve all the problems for position lines by a single formula of spherical trigonometry. An extension of the well-known Martelli method for hour angle to the leading problems of celo-navigation in general. This is Mr. Goodwin's last work and it might well have been designated "Alpha, Beta, Omega Tables" for it appears to be about the last word for brevity and adaptability.

"It was my good fortune and great pleasure to know Mr. Goodwin personally, and I only regret that our meetings had not been more frequent. Mr. Goodwin had a brilliant mind, he was a very interesting and pleasant companion, a man of generous nature, a kind-hearted, genial gentleman, and I fully appreciate the great loss his friends have sustained and to these I extend my sympathy."